



FRIDAY, JULY 26, 1895.

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Contributions.

The Ideal Electric Supply Station.

BOSTON, July 23, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A correction is necessary in next to the last paragraph of the article you published over my signature in the issue of July 19th. You make me say:

"The ideal arrangement for an electrical supply station would seem to be a generating plant of the most economical type, supplemented by a storage battery of sufficient size to carry that part of the load which exceeds the capacity of the station during all the hours such extra demand exists, and absorbing, during the hours when the outside load is light, the surplus which the plant can furnish, supplemented by a small amount of low cost machinery for the maximum demand during the heaviest portion of the day."

The italicized part should be omitted from this paragraph, and inserted in a new one following that just referred to, and reading as follows:

"An alternative plan would be a generating plant of the sort mentioned above for somewhat more than the average load during the working hours, supplemented by a small amount of low cost machinery for the maximum demand during the heaviest portion of the day."

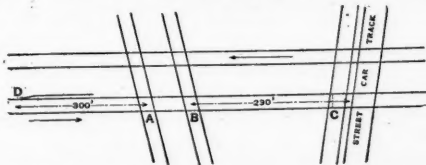
GEORGE W. BLODGETT.

Derailing Switches Dangerously Located.

Lake Shore & Mich. Southern Ry.,
TOLEDO, O., July 16, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In one of your recent numbers you make mention of a discussion on safe speeds over interlockings. In the light of some recent derailments in this region, I should say that the safe speed over an interlocking is that which will insure the stoppage of a derailed train before it reaches the crossing. That speed is certainly very much slower than much of the present practice. Very recently at Del Rey crossing, near Detroit, a freight train ran off an open derail, reached the crossing and tore up the first crossing; the engine jumped onto the track at the second crossing and ran four car lengths beyond it before coming to a full stop. When the engine ran off the derail at



It broke the fastenings of the point rail, splices and all, and threw it out, then tore up most of the guard rail and when it reached the railroad crossing at A the wheels on the left side were more than half way over to the next track, clear off the ties and the engine ready to topple over. It struck crossing A and tore it up, then jumped back onto the rails at the second crossing B, and when it stopped the pilot was at the street crossing C. When the derail was clear out of the way the cars had their choice of going off or jumping the gap and staying on. They ran about half and half in that respect; about half the wheels being on and half off when the train came to a stop.

The engineer claims he was going little, if any, over 10 miles an hour and that the reverse lever was over and brake on from the time he dropped off at the derail till he stopped.

It seems to me that the old standard of 300 ft. from crossing for derail is entirely insufficient. With the increased speed common since the introduction of interlockings and the increased safeguards to prevent a de-

railed engine from at once tipping over, we have virtually lost all the protection that should be afforded the opposing road. I feel quite certain that in a vast majority of the cases a derailed train at even moderate speed would reach the crossing, especially heavy freight trains with little or no air on the train. I suppose that little or nothing will be done, however, till some terrible accident rouses both railroad officials and state commissioners to a realization that some radical change is needed to preserve the protection supposed to be secured by interlocking.

SIGNAL INSPECTOR.

Mr. Aspinall on Express Speeds.

Lehigh Valley Railroad System,
SOUTH PLAINFIELD, N. J., July 19, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Has Mr. Aspinall been correctly reported in your issue of July 12, page 460: "If a train running at 60 miles an hour has lost a minute it must run 15 miles at 70 miles an hour to make up that minute"? If a train scheduled to run at 60 miles an hour runs

46½ miles in 47½ min.—1 min. lost
15 " at 70 miles an hour..... 12½ "

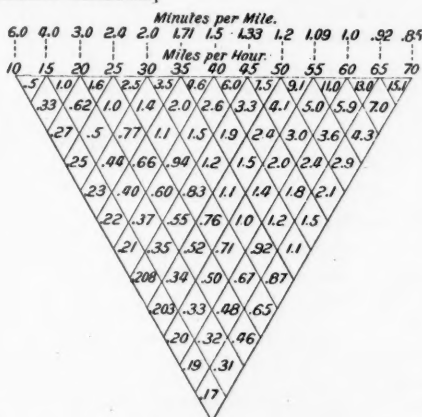
61½ miles. 60 min.
To make up the lost minute only 6 miles at 70 miles per hour would have to be run:

54 miles made in 53 min.—1 min. lost
6 " at 1½ miles per min. 7 "

60 miles made in 60 min.
If Mr. Aspinall meant a minute lost by a detention causing a stop of one minute he is certainly correct, for in such a case more than another minute is lost in slowing down and regaining the speed of 60 miles per hour.

L. E. MOLINEUX.

[We regret that Mr. Aspinall was not correctly reported, and are obliged to our correspondent for calling attention to the fact. Mr. Aspinall said, "If a train running 65 miles an hour has lost a minute, it has to run 15 miles at 70 miles an hour to make up that minute," not 60 miles an hour, as we made him say. Mr. Aspinall gets the distance from Ivatt's speed diagram, which we reproduce here. At 65 miles an hour one mile is made in 0.923 minute; at 70 miles, one mile is made in 0.857 minute. At the 70-mile gait, therefore, we gain 0.066 of a minute in each mile run, and to gain the lost minute we must run 15.1 miles. It will be seen from the diagram that if a minute had been lost on a 60-mile schedule it could be picked up in a 7 miles run at 70 miles an hour; but Mr. Molineux makes it up in 6 minutes. In fact, he, too, has made a mistake as well as the editor or proof-reader, who misquoted Mr. Aspinall. In his demonstration, he says, "54 miles made in 53 minutes, 1 minute lost." Obviously it is 1 minute gained. Using his method, we have 53 miles made in 54 minutes plus 7 miles at 1½ per minute, 6 minutes = 60 miles made in 60 minutes. Probably Mr. Molineux transposed his miles and minutes in copying.—EDITOR RAILROAD GAZETTE.]



The table shows the distance in which one minute will be made or lost by an increase or decrease of five miles an hour in the average speed. Suppose the average speed required is 20 miles an hour, and the speed is increased to 25 miles an hour, one minute will be made up in every 1.6 miles run. From 20 to 30 miles an hour, one minute will be made up in every mile run. Take the extreme case, if the average speed is 10 miles an hour, and this be increased to 70, one minute will be made up in every .17 miles run.

Advantages and Disadvantages of Lock and Block Apparatus.

"The Advantages and Disadvantages of Lock and Block on a Busy Railroad" is the title of a brief paper presented to the International Railway Congress at London this year by Mr. H. Raynar Wilson, Signaling Assistant to the Engineer of the Lancashire & Yorkshire Railway. It appears as a postscript in the pamphlet containing the paper by Mr. A. M. Thompson, which was given in the *Railroad Gazette* of July 19. Mr. Wilson refers to 13 collisions described in the Government reports which would have been prevented by a suitable electrically locked system of block signaling apparatus. These collisions were at Colwick, Jan. 2, 1890; Gorgie, Nov. 11, 1890; Primrose Hill, Nov. 13, 1890; Wortley, Dec. 24, 1890; Vauxhall, Jan. 5, 1891; Dalry, April 30, 1891; Norwood-Fork Junction, Dec. 17, 1891; St. John's Wood, June 4, 1892; Bishopsgate, June 14, 1892; Kentish Town, Oct. 31, 1892; Thirsk, Nov. 2, 1892; Phillips Park, Dec. 8,

1892; Chequerbent, Jan. 20, 1895. In addition to these, Mr. Wilson mentions the collision at Norton Fitzwarren, Nov. 11, 1890, "which could have been avoided by the use of a perfect lock and block." Evidently, he believes that the other collisions could have been prevented by something less than perfect. The paper then continues:

Most installations provide for the train securing own protection, or at least removing the protection, on its arrival at the next cabin. This is done by means of a rail contact which comes into play on the train passing over it, and releases a lock on the signal in the rear cabin.

A recent design is a combination of such an arrangement with automatic interlocking attached to the levers, working the signals, a signal being given for every operation, and before any movement can be made, a signal has to be lowered, and the movement of this signal frees the line the signal leads from and locks the line it leads to.

Another design dispenses with treadles and is arranged that when the starting signal is put to danger it locks itself until the signalman in advance frees it. This arrangement has added to it the principle of automatic locking applied to signals for every operation.

There is no doubt that these two latter installations are more advanced than the others, though neither of them would have met the mishap at Chequerbent which is quoted by the Board of Trade. This would only have been met by another system recently revived which provides treadles for all operations in such a manner that a train by the act of going through a cross-over road releases the one line and locks the other, by the act of going into a siding frees the main line, and by the act of leaving the siding locks the main line.

But notwithstanding all this advancement we are met with this difficulty, that the pulling off a disc for part of a train to go from say the up line to an up siding, would, on the disc being put to danger free the up line although part of the train still stood on the up line, and the same remark applies to the treadle arrangement which on being depressed by the train entering the siding would free the up line with part of the train standing on it.

Again there is difficulty that will have to be faced and that is the question of slip coaches and trains divided in the section. This no doubt is having attention from electrical engineers some of whom have brought forward ideas to meet the difficulty, but so far the means provided are permissive and not compulsory.

In those systems where provision is not made for trains shunted from one main line to another or into a siding, something has to be done to free the line where a train has been removed. In most of the cases a key is provided for this purpose which as a rule, can only be obtained by some extra trouble, the idea being that the improper use of the key is thus safeguarded against.

To avoid the improper use of the means of release, in some cases the arrangements for clearing the line are in the hands of the station staff as well as the signalman, but it is easy to understand that the platform staff might clear the line too soon or perhaps not clear it at all.

In order to properly protect a train that has gone into the next section, it is necessary that the advance signal at the cabin in the rear should be locked at danger. This is done in some cases automatically by the train itself, which going over a treadle, releases the arm which flies to danger and which cannot be lowered until the train has arrived at the cabin in advance. This idea is very good and meets the difficulties of the case. There are, however, objections which though small, remove a good deal of the advantages of the arrangement.

For instance, the last paragraph of No. 154 of the Clearing-house rules and regulations provides that when a home signal has been lowered for a train it must not be put to danger until the last vehicle of the train has passed it. This means that the automatic arrangement should be placed a train's length in advance of the home signal. The importance of this is manifest. Were the treadle under a train's length it would be possible for the signal to be placed at danger with part of the train unprotected, and again, it is desirable that the rear guard of the train should himself see the signal whether "on" or "off," but this he often could not do if the signal were at danger when he reached it.

But it is easy to understand a short goods train stopping properly inside the home signal and duly protected; and yet because it does not reach the treadle the line cannot be cleared for a second goods train to be accepted under the "warning arrangement."

But one of the principal objections to lock and block, and where it applies more particularly to the Lancashire & Yorkshire Railway, lies in the fact that if laid down as now arranged the use of short block sections is rendered futile.

Of the 855 block cabins on the Lancashire & Yorkshire line (521½ miles = 840 km. long and averaging one cabin to every 1,400 yds. = 1,200 m.) 111 are under a full train's length (440 yds. = 402 m.) from the cabin in the rear.

There are 63 cases of such sections standing alone, eight cases where there are two short sections together, four cases of three, one of four, two of five, and one case of six continuous short sections.

The Lancashire & Yorkshire block regulations say that in such short sections "Line Clear" may be given, and the "Be Ready" signal accepted for a train, providing the previous train is under cover of the home signal for the box in advance.

It has been pointed out that the treadle which releases the cabin in the rear should be a train's length in advance of the home signal, which means in short sections that the treadle is in the next section. Now the treadles should be so arranged that the first wheel should not release the locking or it will be released a train's length too soon, but the last wheel should perform the duty. This may be done by making the treadle in bar form, and the length of the longest wheel base; but this means that in the case of a short section the train would be clear of the rear section, but as some part of it would be standing on the treadle, line clear could not be given.

In conclusion, it is but right that testimony should be borne to the excellent results already achieved by engineers in overcoming so many of the innumerable difficulties of lock and block, also to the large number of mishaps that must have been avoided on lines where lock and block is in use.

Track Elevation in Chicago.

The Chicago & Northwestern Railway has begun elevating the tracks of the Galena Division, as was mentioned in the *Railroad Gazette* of April 26, and through the courtesy of Mr. Louis H. Evans, Division Engineer, we are enabled to give herewith plans and a description of the works.

The part of the track to be elevated begins 1,080 ft. east

of Sacramento avenue and extends 2,045 ft. west of West Fortieth street, being almost two miles in length. From Sacramento to Kedzie avenues there are six tracks, there being seven across Sacramento avenue, one of which is a stub, ending a short distance to the west of that street. There are but five across Kedzie street, the sixth uniting with the adjacent one just before the street crossing is reached. From Kedzie avenue to West Fortieth street there are five tracks, but a short distance before the latter street is reached four more branch out, making nine tracks at the crossing. At this point the West Chicago shops of the Chicago & Northwestern are situated. Along this stretch of tracks there are six crossings that the railroad company have agreed to provide with subways, the one at Sacramento avenue already having a subway, built in 1893. There is to be 13.6 ft. head room under each subway and the slope of each street approach to the horizontal portion beneath the tracks is to be 3.5 ft. in 100.

As there is considerable travel over each of the streets, which are spaced from 660 to 1,315 ft. apart, it was necessary that the crossings should not be obstructed for any length of time, and also it was important that no delay should occur in the traffic of the railroad. To overcome these difficulties was an engineering problem requiring considerable skill, and its solution was effected in a novel and ingenious manner. It was decided to have the spans at the various streets made up of plate girders, of which 44 are required, six for each of the crossings, except that at West Fortieth street, where the main tracks require 14 girders. These are shipped to the railroad shops at West Fortieth street, and there put together in pairs on flat cars, the floors in position, and the rails in

After that, blocking by 12-in. pieces will be used until the tracks are brought to their final elevation.

As soon as the girders are first in position the excavation for the streets may be started and can continue uninterruptedly until completed. The following table gives the data concerning the elevation of the tracks and depression of the streets:

Street.	Depression, feet.	Elevation of tracks, feet.	Length of horizontal roadway beneath the tracks, feet.	Length of inclines, feet.
West Fortieth.....	6.1	8.5	306	175
Hamlin Ave.....	3.22	11.4	120	92
Central Park Boulevard.	2.34	12.26	120	115
St. Louis Ave.....	3.18	11.59	150	91
Homan Ave.....	3.50	11.3	149.72	100
Kedzie Ave.....	3.82	10.69	130	110
Sacramento Ave.....	3.88		

At Sacramento avenue the roadway of the present subway will have to be raised as much as the tracks are.

The work has been begun at Sacramento avenue, and will be carried westward, the roadbed of the tracks between subways being filled in with sand until the final elevation is reached, when gravel ballast will be used. The method of filling is also one of the novel features, and the plan to be followed does away with the necessity for putting the whole stretch of track in such a condition as to cause trains to be run slowly over it. This is shown in Fig. 6, in which the lower full line indicates the present location of the track; the upper full line, the track when elevated to its final position, and the in-

the street and sidewalks; at Central Park boulevard there is a row of columns placed in the street between the drive and tramways, necessitating two spans; at Hamlin avenue and West Fortieth street there are two rows of columns on the curb lines with a long span over each street and shorter ones over the sidewalks.

The abutments are of similar construction, the one at Homan avenue, Fig. 12, being taken as an example for illustration. There is a 6-ft. foundation of concrete resting on the subsoil of blue clay, which is very solid and dry. Above this foundation there are three 18-in. courses of stone, then three 16-in. courses, on top of which are two 15-in. courses, surmounted by a final 15-in. course which forms the bridge seat. All the abutments are limestone cut to size at the quarry. The dotted lines on the sides show the sand filling in the rear of the abutment.

There is nothing of special importance in the girder construction except the end bearings, which consist of two castings at each end, the upper one being concave and the lower convex. The bearing surfaces are machine-finished. At one end roller bearings are provided to allow for expansion and contraction. These girders are all at right angles to the abutments except at West Fortieth street, as shown in Fig. 3.

The construction of the floors, which is shown in section very imperfectly in Fig. 4, is worthy of attention. The floor beams, consisting of two 10-in. channels, separated by $\frac{1}{4}$ -in. filler plates, extending to within 12 in. of the ends, are spaced 4 ft. 6 in. between centers, which is the shortest distance between the axles of the company's standard locomotives. The fillers, being of exactly the same thickness as the gusset plates on the girder, permit these beams to be lowered into position from the top and fastened to the gusset plates. This is done by nine $\frac{1}{4}$ -in. rivets at each end. On the top and bottom of each beam are $\frac{3}{4}$ -in. \times 8-in. plates, and $\frac{1}{8}$ -in. deck plates rest on the top. Between each beam are four 6 \times 12-in. oak stringers to carry the rails, two being placed in conjunction for each guard rail and rail. These are carried by 3 \times 8-in. angles, which are riveted to the webs of the floor beams and support the ends of the stringers. A further stiffening of the stringers is secured by a $\frac{1}{8}$ -in. bottom plate and two 6-in. Z bars, for each pair of stringers, the whole forming a trough which rests on the end angles. The Z bars are riveted both to the bottom plate below the stringers and to the deck plate, which is also fastened to the girders and gusset plates by 2 \times 2-in. angles, and stiffened longitudinally by similar angles in the center between the guard rails and at the sides near the gusset plates. The depth of this floor is about 1 ft. and weight 550 lbs. per ft.

The rails are placed on tie plates, the centers of the rails being exactly over the joint between the stringers. They are secured to the stringers by bolts passing through stringer and bottom plate for the inside flange and lag screws for the outside. Between the heads of the guard rail and main rail is a distance of 7 in., the guard rail being held on the inside by cast-iron clips riveted to the deck plate, and on the outside by lag screws to the stringers. An 80 lb. rail is used.

Further information upon this subject may be obtained by reference to the *Railroad Gazette* for July 28 and December 1, 1893, and March 30 and October 19, 1894.

The Literary Product of the International Engineering Congress of 1893.*

The writer desires to present some notes regarding the publication of the proceedings of the International Engineering Congress, held in Chicago in 1893. . . . For the benefit of all interested, the writer, who had much to do with the preparations for the Congress, will put on record some facts which may not have been published. . . .

The question arose early among those who were managing the work, both in Chicago and elsewhere, of what should be done if the Worlds Congress Auxiliary should fail to make its promise good to provide the means for conducting the Congresses and printing their Proceedings. After some correspondence and conference the opinion became general that the arrangements for the Engineering Congress should include that of publishing, so that if the Auxiliary should fail the valuable results of our Congress would not go into pigeon holes or packing boxes.

The United States Congress refused utterly to expend a dollar in printing the Proceedings of the Congresses. The Engineers were thus thrown back upon their own resources. It is, however, an Engineer's business to be always resourceful and there could be no exception to the rule now. It was arranged, it had been already, that the Proceedings of the Divisions of Civil, Mechanical, Mining and Metallurgical Engineering should be printed by the three national societies and that the newly formed Societies of Engineering Education, the outgrowth of the Congress, should print the Proceeding of that Division; but the Naval and Military Divisions conducted by Commodore Melville and by Major Clifton Comly, respectively, found themselves with no financial assistance whatever. Commodore Melville at one time seriously considered the idea of appealing to the great ship building concerns of the country, but a wiser course was found by printing the Proceedings through the publishing house of John Wiley & Sons of New York. So valuable were

*Extracts from a paper presented by Mr. E. L. Corthell at the Convention of the American Society of Civil Engineers, June 1895.

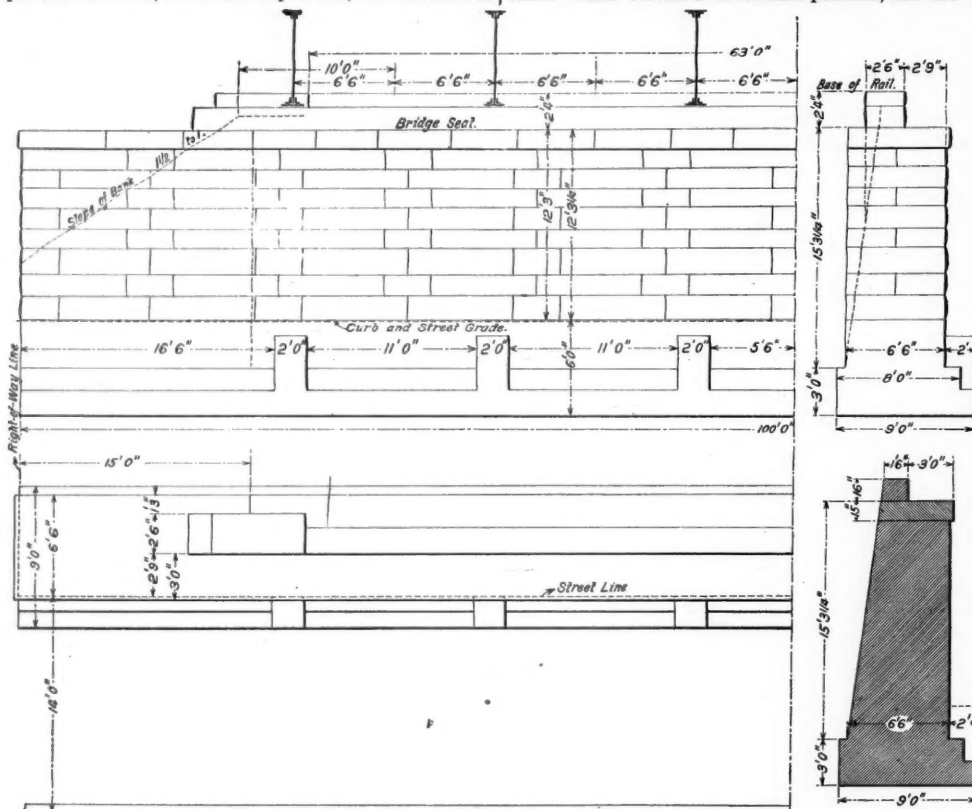


Fig. 12.—Homan Avenue Subway—Chicago Track Elevation.

place. They are then run out into position. Before this is done four piles are driven at the end of each pair of girders to a sufficient depth to carry the weight of passing trains and the girders. These piles will be sawed off and bound together by three-inch planks, as shown in Fig. 1. Resting on top of each two of these piles will be two 15-in. I beams, 11 ft. long, bolted together by three $\frac{3}{4}$ in. bolts, and having a $\frac{1}{4}$ in. saddle plate upset over the flanges of the beams. This forms the resting place for the girders. These piles are to form support for the girders until the abutments are completed, and the top of the saddle plates will be 5 ft. 6 in. above the present position of the tracks.

After the piling is completed the girders on the cars will be run into position (see Figs. 2 and 3), one pair at a time, raised free of the cars by jacks and lowered on to the I-beams. The cars will be then pulled out and the filling completed for this first temporary position. No two adjacent tracks are to be loaded at the same time, the two extreme and the middle one to be first finished. This will leave the other two tracks in service. Outside of the piles are to be put 3-in. planks, shown in Fig. 4, and the abutments built between the piles, the object of the planks being to prevent the filling from interfering with the masonry construction. By referring to Fig. 4 it will be seen that a space of 9 ft. is left between the rows of piling, which affords ample room for the masonry work to be carried on. As this progresses the girders and their supporting I-beams will be raised by jacks 12 in. at a time, the first step up permitting the placing of 12 \times 12 in. timbers, Fig. 5, which take the place of the 3-in. planks and firmly bind the piling together laterally, which will be further assisted by a cross-bracing put in as the excavation is made for the streets'

intermediate broken lines, the different positions of the track during the progress of the elevation. As has been said before, the work was begun at the eastern end. The viaduct at Sacramento avenue was jacked up while the larger triangle numbered 1 was filled in. Then after the smaller triangle 1 is filled in, the girders for the Kedzie avenue viaduct are to be put in their temporary position and the triangles numbered 2 are filled in. After filling in 3 and 4, the Homan avenue viaduct girders will be placed and 5, 5 filled in. This method is to be followed throughout the entire length, the consecutive numbered spaces being filled in in order. The interlocking plants at Sacramento Avenue and West Fortieth street are electro-pneumatic, which simplifies the work at these points, it only being necessary to make the air connection with rubber hose and pipe in order to keep the plant in operation. This, of course, is of great assistance in the handling of the trains. After the completion of the work, the switches to the main lines at these two points will be removed and the interlocking plants taken out.

The railroad right of way between Sacramento and Kedzie avenues is 100 ft. wide, which will permit the placing of seven tracks instead of six, as are now in use. A retaining wall will be built along the north side of this space, as is shown in Fig. 7, which also shows the abutments at the streets. Should it be necessary to build the seventh track, a similar wall will be built along the southern line of the right of way.

Plate girders will be used for all the viaducts, as has been said, the cross-sections of the different subways being shown in Figs. 8, 9, 10 and 11. It will be seen from these figures that at Kedzie, Homan and St. Louis avenues, the bridges consist of one span extending over both

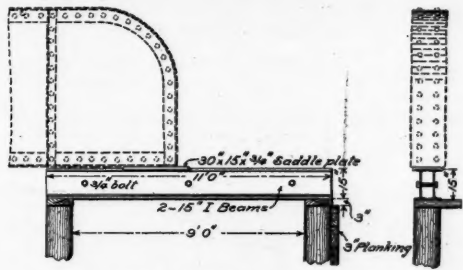


Fig. 1.—Details of Girder Resting on I-Beams.

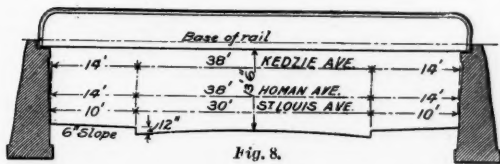


Fig. 8.

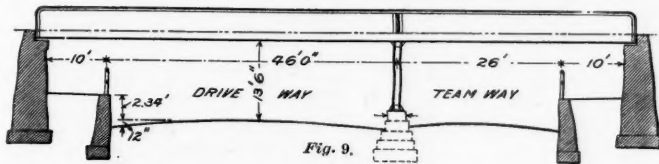


Fig. 9.

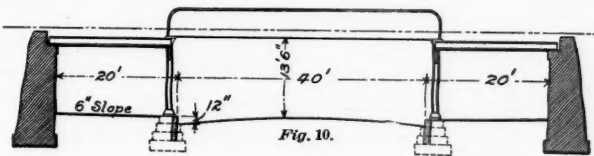


Fig. 10.

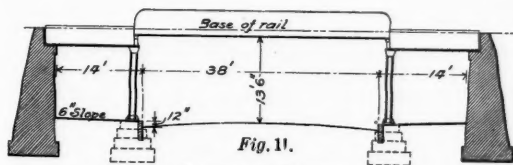


Fig. 11.

Sections of Subways.

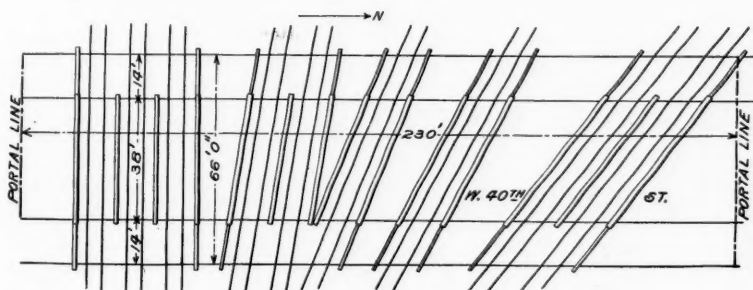


Fig. 13. Roof Girders of Subway.

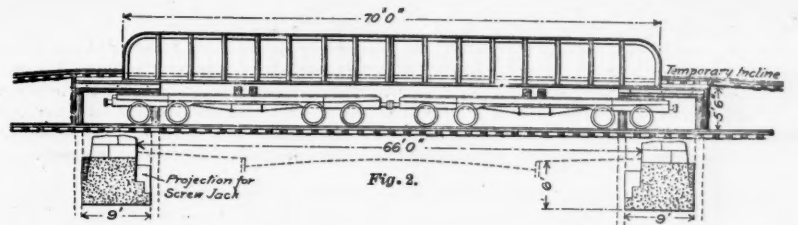


Fig. 2.

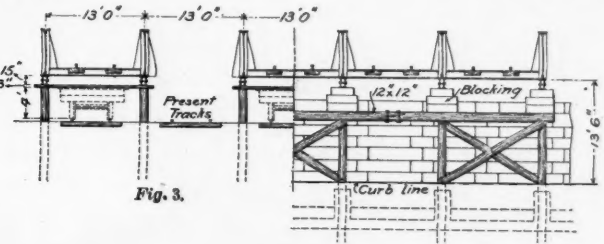


Fig. 3.

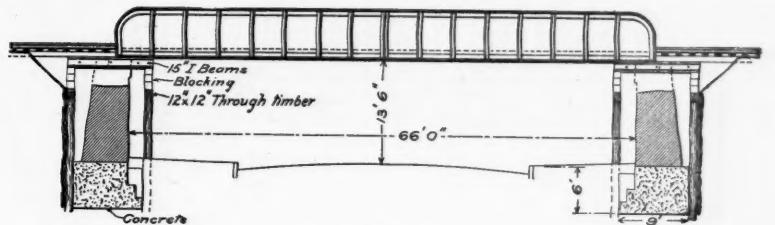
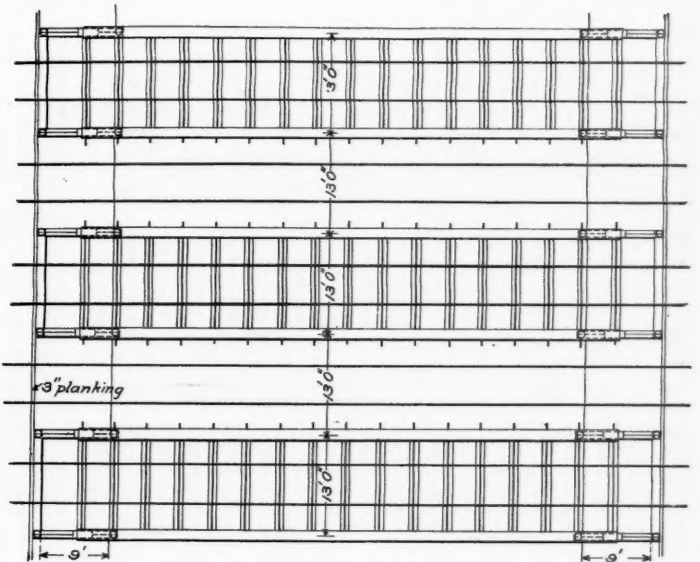


Fig. 4.



Bridge when Raised into Position.

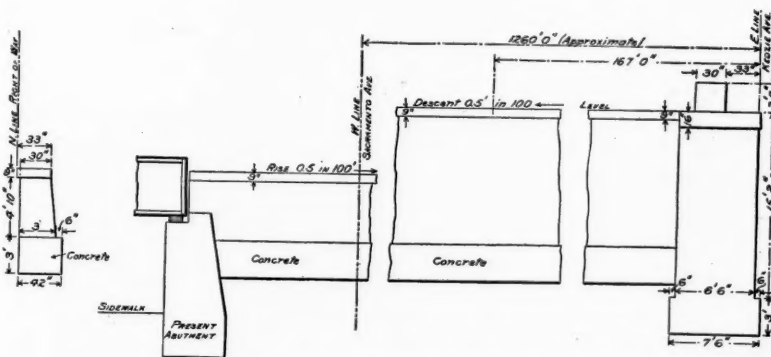


Fig. 7.—Retaining Wall between Kedzie and Sacramento Avenues—Chicago Track Elevation.



Fig. 14.—Girders for Subway at St. Louis Avenue.

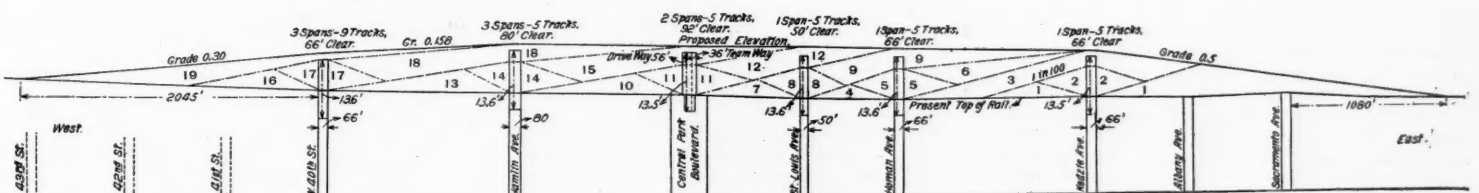


Fig. 6.—Construction Profile—Chicago Track Elevation.

DETAILS OF BRIDGES AND SUBWAYS—CHICAGO TRACK ELEVATION.

the papers of this division that three publishing houses offered to print them.

At one time there seemed to be disaster before the Military Division, as Major Comly had suddenly died before the arrangements for printing were consummated and Lieut. H. F. Harris, the Secretary of the Division, was, tied by military regulations, unable to move the matter forward and could only edit the papers, prepare them for printing and file them with the War Department.

volumes form a cyclopedia of engineering of the greatest value and should be upon the library shelves of every engineer.

The professional and social results were also of the greatest benefit. By personal contact and by much correspondence we have become acquainted with the engineers of other countries to an extent not possible in any other way.

The results obtained are well worth the cost. It is

The Stow flexible shaft is used with this device for tapping and putting in stay-bolts, which is done at a speed of 175 revolutions a minute.

The Diamond Pressed Steel Truck Frame and Body Bolster.

There is perhaps no part of a freight car more in need of improvement than the truck frame. What is commonly known as the diamond form of truck has been

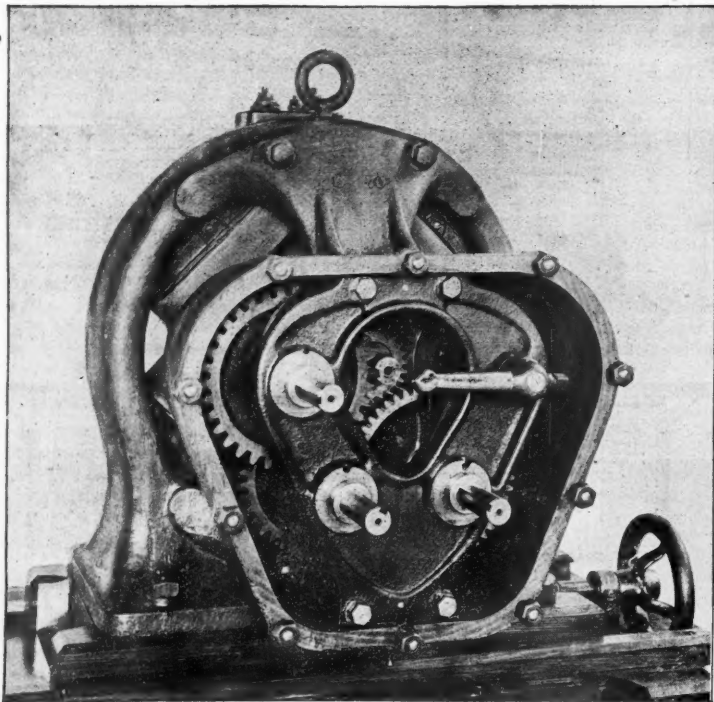


Fig. 2.

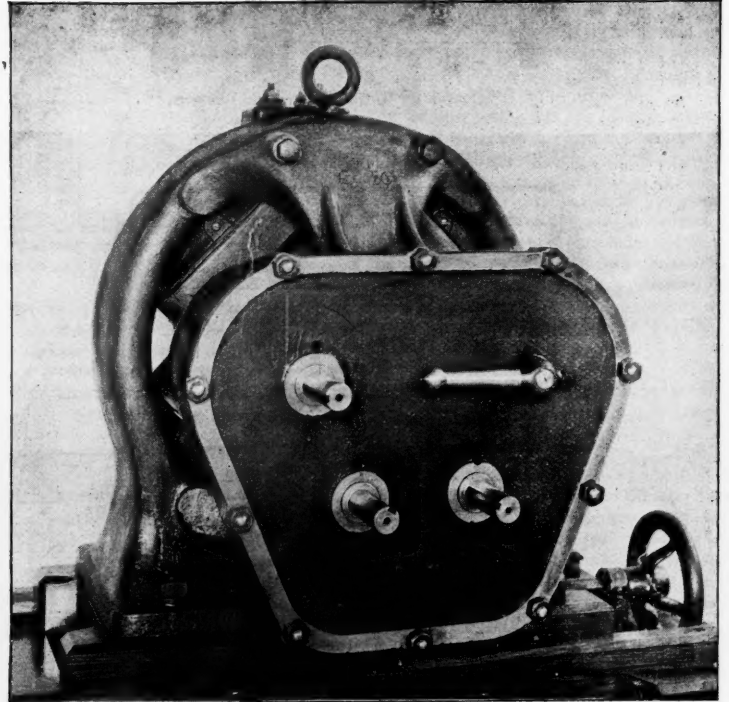


Fig. 3.

Gibbs Variable-Speed, Shop Motor.

ment. In June last the writer was in Washington partly on this business, determined to do everything that was possible to bring out what was well known to be very important and valuable papers contributed to the Congress not only by our own military men, but by those of several foreign countries. He went directly to the Secretary of War, Mr. Lamont, personally laid the case before him and asked his assistance, but was met by the discouraging fact that, on account of the decidedly adverse opinion of Congress, the heads of government departments had agreed together not to print or ask of Congress to print any of the proceedings of the World's Congresses. There was nothing to do therefore but to go direct to Congress itself, which the writer did at once, appealing to Senator (General) Manderson, member of the Joint Committee on Printing, stating to him personally and earnestly all the facts and making plain to him the obligation of our Government to print and distribute the Proceedings of the Military Division of the Engineering Congress. The Senator agreed to offer a joint resolution to authorize the printing of these papers. The matter, however, did not end there; it required personal attention, effort and watchfulness until nearly the close of the session, and the writer at last cabled Senator Manderson from Switzerland reminding him of the desired passage of the joint resolution. It was passed, and 1,000 copies printed and distributed.

The writer having been able to get together the Proceedings of the Engineering Congress, takes satisfaction in the nine solid volumes of printed matter, not mentioning the Aerial Navigation Conference and the Water Commerce Congress, related to the Engineering Congress.

The writer has made an approximate analysis of the nine volumes above mentioned, and gives it following as a matter of general interest. These volumes are distributed as follows:

Division A.—Civil Engineering, printed by Am. Soc. C. E. Two volumes.

Division B.—Mechanical Engineering, by Am. Soc. Mechanical Engrs. One volume.

Division C. and D.—Mining and Metallurgical Engineering, printed by the Am. Institute Mining Engineers. Two volumes.

Division E.—Engineering Education, printed by the Society for the Promotion of Engineering Education. One volume.

Division F.—Military Engineering, printed by the United States Government. One volume.

Division G.—Marine Engineering and Naval Architecture, printed by John Wiley & Sons, New York. Two volumes.

Total, nine volumes. Seventeen countries furnished 210 papers containing 5,520 pages of original papers, 864 pages of discussion, and 420 plates, besides paged plates.

The value of the literary product of the first International Congress of Engineers cannot easily be overestimated. The busy practical experts, men of affairs of these 17 countries of the world, laid aside their absorbing work for a time and gave to the engineering profession, and through it to the world, the benefit of their valuable experience in all kinds of engineering work. These nine

difficult to estimate what this cost has been to the engineers of this country. Including the cost of the headquarters, established and operated by the engineers of this country and Canada, the entire cost does not fall far short of \$50,000. Some idea of the labor involved in the work of the different divisions may be formed from the fact that in the Division of Marine Engineering about 1,000 letters were sent out and nearly 800 replies received.

A Variable Speed Electric Motor for Shops.

The three illustrations show a new, variable-speed, combination drill motor, built for the Illinois Central Railway by the Gibbs Electric Company, of Milwaukee. One of these motors has been in operation for some time in the West Milwaukee shops of the Chicago, Milwaukee & St. Paul Railway. The size shown by the illustrations is 5 horse-power. It has a pulley at the commutator end of the shaft to receive the belt for driving almost any sort of machine tools, such as drills, lathes and planers, and, more particularly, the portable drills and tapping machines used in boiler work. Fig. 1 shows this pulley. Fig. 2 shows the back gears, which are provided for the purpose of giving a change in speed, such as is provided by the back gears of an engine lathe. By this means changes in speed may be made thus: 850, 165, 93 or 38 revolutions per minute.

As shown, the motor is mounted on a standard base frame, but it is also provided with a four-wheel truck, which carries a resistance box, which can be made to vary the speed of the motor in any degree within the requirements of the use of machine tools. It carries also a reel with an electric cable, so that the motor may be connected to any convenient electric circuit.

Fig. 2 shows the gear case off and indicates the compact arrangement of the gears. Fig. 3 shows the gear case in position, and with a handle for the changes of speed similar to that used with the ordinary lathe. The device is compact and strong. The motor may be run with the gear case off, as the object of the case is mainly to keep the oil in and the dirt out. The case is filled with oil for lubrication up to the first row of spindles.

almost universally accepted as the standard truck, and there can be no question that it has many good points or it would not be so universally used. There are, however, several defects in it; certainly in the details of construction and the material used, whatever we may think of the general design.

Our engraving shows the diamond pressed steel truck frame designed by Mr. Chas. T. Schoen, President of the Schoen Manufacturing Co., of Pittsburgh. Mr. Schoen is a pioneer in the pressed steel business, and has given much attention to this new and valuable line of work; in designing this frame he has sought to preserve the good features of the old diamond truck and to eliminate its defects. A careful examination of the design will show how he has succeeded.

In the ordinary diamond truck the side frames are

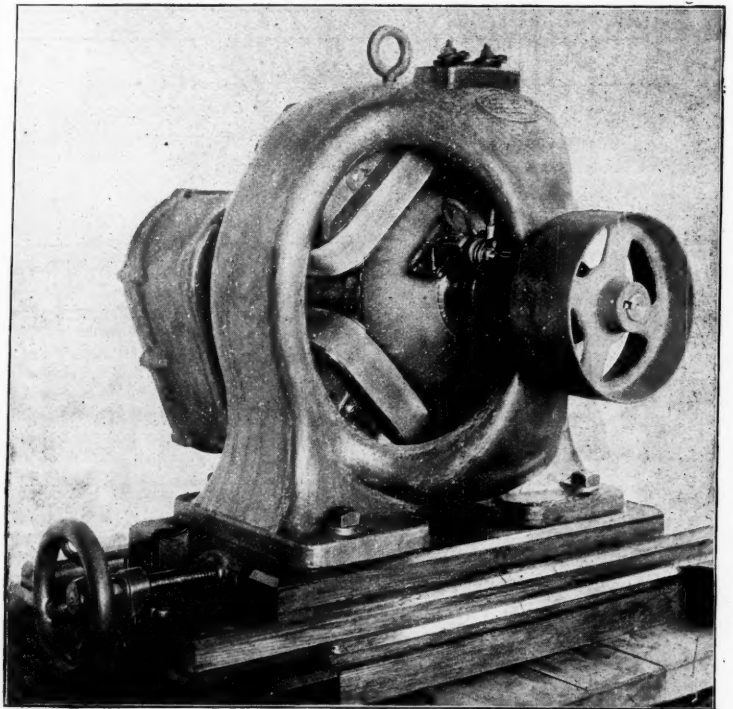


Fig. 1.—Gibbs variable-Speed Motor.

made of a bottom and top arch bar, with columns of cast iron and 1½ in. bolts to complete the truss. There being plenty of room for the bolts to pass freely through the arch bars and columns, the inevitable result is, that as soon as the truck is put in service, wear commences; the holes wear larger, the bolts wear smaller. These very large holes in the arch bars greatly weaken the truss and this weakness is increased by the wear. The

columns also, being of cast iron, are easily broken by the shocks of service. Another source of weakness is in the spring planks or channels commonly used to join the trusses. These are usually 12 in. wide and bolted to the columns. It is impossible to keep the truck frames square with this construction. It is quite obvious that with a five-foot wheel base it would be next to impossible to prevent the truck frame from getting out of square where the side trusses are held parallel only by these central struts 12 in. wide bolted together, with no attempt at having the bolts fitted. Even were the bolts fitted, the wear on bolts and holes would soon allow the frame to get out of square.

These defects are remedied in the pressed steel truck frame. Instead of the ordinary arch bars, pressed steel channels are used. They are, say $\frac{1}{2}$ in. thick and 7 in. wide, pressed into the shape of channels. The upper one, the compression member of the truss, is narrower at the middle than at the ends, thus making the flanges deeper at the point of greatest strain. Instead of the large bolt

plying with the law concerning standard heights of drawbars and the application of grabirons or handholds. Upon comparatively short notice the following gentlemen made it a special point to attend the meeting, viz.:

John Player and Jas. Collinson, of the A., T. & S. F.; W. H. Harrison, E. W. Grieves and Joseph Billingham, of the B. & O.; G. W. Rhodes, R. D. Smith and A. Forsyth, of the C. B. & Q.; C. A. Schroyer, of the C. & N. W.; M. B. Haskell, of the C. & W. M.; J. N. Barr, of the C. & St. P.; Alfred Child, of the C. E. I. & P.; P. H. Peck, of the C. & W. I. and Helt; C. J. Clifford, of the C. & B. I.; Jos. Townsend, of the C. & A.; Wm. Garstang (represented by W. G. Taylor), of the C., C. & St. L.; E. T. Carleton, of the E., J. & E.; J. J. Casey, of the Ill. Cent.; Charles Colter, of the L., N. A. & C.; A. M. Walt, of the L. S. & M. S.; E. D. Bronner, of the Mich. Cent.; John Mackenzie, of the N. Y., C. & St. L.; W. Lavery, of the N. Y., L. E. & W.; S. P. Bush, of the Penna. Ry. Co.; J. McNaughton, of the Wis. Cent. Ry.

The meeting convened at 10 a. m. Mr. John Mackenzie, of the N. Y., C. & St. L. Ry., was elected Chairman and Mr. W. G. Taylor, of the C., C. & St. L., was elected Secretary.

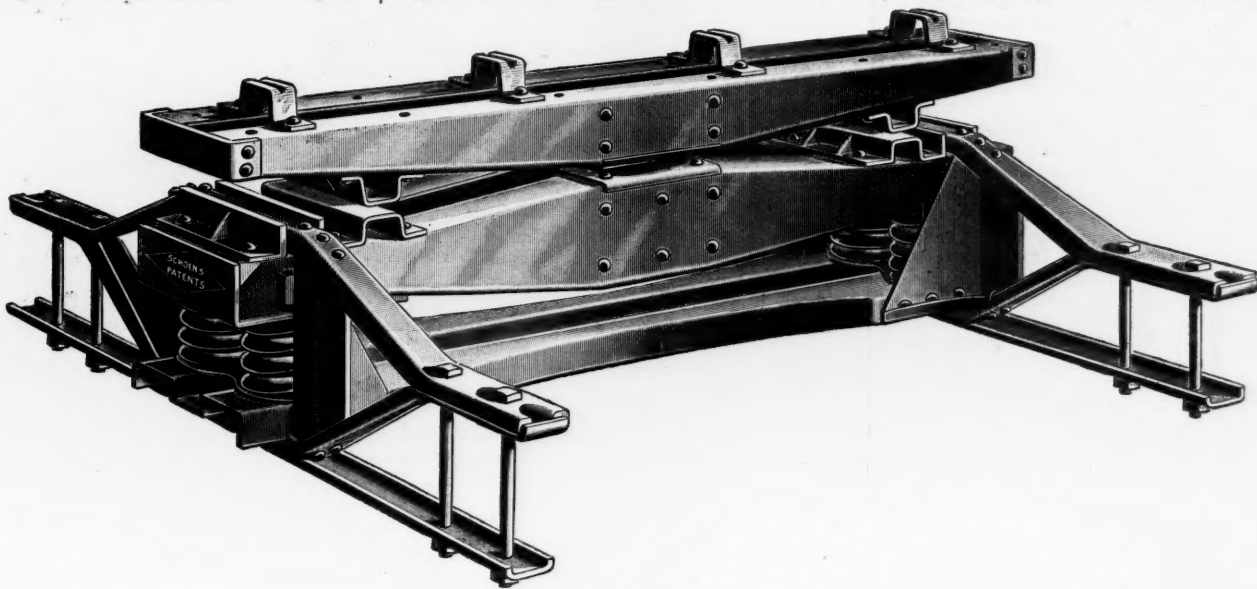
Upon request of the Chairman, Mr. J. W. Cloud, secre-

termine by trial and consultation with the employees of the several roads represented on the committee, what location seems to be best for handholds on cars of different classes. This committee will report to the Executive Committee on or before August 15, and after a consultation with the Interstate Commerce Commission to learn that the recommendations will probably fill the requirements of the law, they will be submitted to the members by informal letter ballot as an indication of what can be adopted in 1896. The results of this ballot are expected early in September.

As it is important, owing to the short extension granted by the commission, that the work of equipping should progress in the meantime, it may be said that it will probably be safe for car owners to equip cars with handholds or grabirons in accordance with circular from this office dated June 27, 1895, copy inclosed.

The Patton Tunnel on the L., E. & St. L.

This tunnel has long been a source of annoyance and trouble to the Louisville, Evansville & St. Louis Railroad. It is near Taswell, 52 miles west of Louisville. Some years ago the wooden lining of the tunnel caught fire, and large quantities of earth and rock fell to the track, stopping all traffic and requiring about three



The Schoen Pressed-Steel Diamond Truck.

holes there are three $\frac{3}{8}$ -in. rivets in line, and as these holes are through a plate 7 in. wide, the advantage over the old practice of cutting away one-third of the strength of the arch bar is obvious. Instead of the cast column, a pressed steel column, in the shape of an angle with its ends boxed in solid, is used. The boxed ends are riveted solidly to the lower and upper arch bar, thus leaving no opportunity for wear. These columns are 8 in. wide on the outer face, and the bottom ends, as may be seen, form a brace or gusset. This construction binds solidly the side frame to the channel for 28 in. or 14 in. each side of the center of frame, thereby shortening the leverage and reducing to a minimum the liability of the truck to get out of square when it strikes a curve.

The bolsters are of pressed steel and of the general design of those now being made largely by the Schoen Manufacturing Company. They are held in position laterally by the pressed steel angle plates across the ends of the bolsters and by a flange on the edge of the side bearings. Swelled places on the sides of the bolsters near the end cause them to fit between the column. The complete frame, which consists of the two side frames, and the double, pressed steel channel which unites them, as may be seen, are thoroughly riveted together.

The advantages claimed for this truck frame are many:

- 1st. All wood is eliminated, giving a purely metallic truck.
- 2d. The wear of bolts and bolt holes is done away with, all parts being riveted.
- 3d. The weight is reduced to a minimum, the saving in this respect being great.
- 4th. The strength of the truck is greatly increased, the fiber strain being estimated at about 3,000 lbs. per square inch in the side frames.
- 5th. The cost is not much more than the ordinary truck, and the difference will, it is believed, be saved in one year, in the items of repair and dead weight saved.
- 6th. No change from present standards is necessary; the same journal boxes, springs, etc., can be used.
- 7th. Damages from wrecks can be readily repaired.
- 8th. Delays to cars on account of repairs is reduced to a minimum.
- 9th. The bolsters are so strong that the car does not ride on the side bearings, thereby saving in power necessary to haul a train and also saving flange wear on wheels.
- 10th. When necessary to remove a wheel from under a car it is only necessary to raise the car about one-quarter of an inch to relieve the weight, whereas in a truck with pedestal or solid side frame it is necessary to raise it some 12 in., or the full height of the journal boxes.

The Handhold-Drawbar Law.

On Tuesday, July 16, at the Auditorium Hotel, Chicago, a meeting was held of representatives of the mechanical departments of the railroads entering that city. The meeting, called by Mr. J. N. Barr, was to consider what is best to be done in the way of com-

pany of the Master Car Builders' Association, briefly stated the result of a hearing before the Interstate Commission (held July 12) on the matter of extending the date of compliance with the law. The substance of his remarks was that the Commission had agreed to extend the time as follows: For application of handholds, to December 1, 1895; for raising of drawbars, to February 15, 1896.

The discussion that followed was very thorough, but we are not permitted to publish it. The result of the talk on handholds was the unanimous adoption of the following resolution:

That it is the sense of this meeting that any handhold located within convenient reach of a man standing either side of center of end of car be considered as complying with the law, but for the sake of uniformity the recommended practice of the Master Car Builders' Association be observed as early as possible.

This was passed with the understanding that it should be used in connection with the circular of the Secretary of the M. C. B. Association dated June 27, 1895, which was published in our issue of July 5, 1895, page 452.

The discussion in the matter of raising drawbars was quite extended, and was closed by the passage of the following resolution, expressing the sense of the meeting, viz.:

That when the law goes into effect Feb. 15, 1896, cars in service shall be marked "bad order" if the drawbar measures less than $3\frac{1}{4}$ in. empty or loaded, or higher than $3\frac{1}{4}$ in. empty or loaded.

The question of the proper shop practice to be followed in raising drawbars received notable attention and after careful discussion and consultation, the following resolution was passed, viz.:

That in order to conform with the law when it goes into effect in regard to height of drawbars, good shop practice constitutes raising all cars lower than $3\frac{3}{4}$ in. to above $3\frac{3}{4}$ in., and not more than $3\frac{1}{4}$ in. empty, with new brasses, etc.; and lowering those to $3\frac{1}{4}$ in. that exceed $3\frac{1}{4}$ in. when empty.

This meeting was so satisfactory in every way—in numbers of attendants, in spirit and interest, in freedom of speech—that it was decided to form an organization of mechanical representatives of the railroads entering Chicago, which should hold at least one stated meeting yearly, and as many other meetings as occasion might call for. The following committee was appointed to formulate rules to govern such an association, viz.: J. N. Barr, C. M. & St. P., Chairman; W. H. Harrison, B. & O.; J. J. Casey, Ill. Cent.; S. P. Bush, Penna. Co.; C. A. Schroyer, C. & N. W. This committee was asked to meet Tuesday, July 23, and to report Tuesday, July 30, at a meeting of the New Interchange Association, which will be held at the Auditorium Hotel, Chicago, on that date.

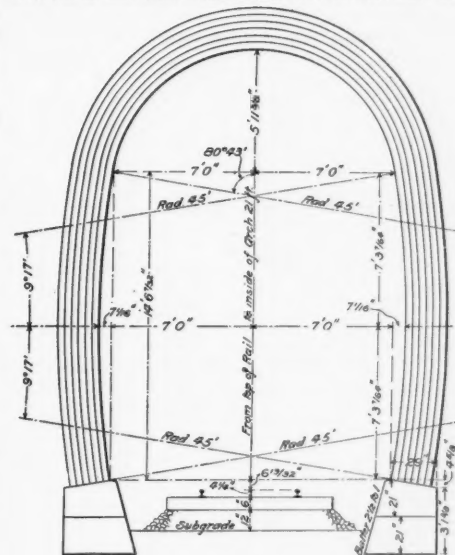
The Secretary of the Master Car Builders' Association, has issued the following circular under date of July 16:

The Interstate Commerce Commission has issued an order extending the date to all carriers, when the law regarding handholds takes effect, to Dec. 1, 1895, and the date when cars must be within 3 in. of standard height, to Feb. 15, 1896.

The Executive Committee of the Association has appointed a committee of eleven members, who will experimentally de-

months to remove it. At that time the timber lining was repaired, but since then a similar trouble has always been feared. It was noticed that because of the fire in question the material over the roof of the tunnel had become loosened almost to the top of the hill, and it was the general opinion that the only way to remedy this would be to make an open cut or a new tunnel. Mr. T. A. Allen, the Chief Engineer of the road, came to the conclusion that this could be avoided by relining the old tunnel with brick, which has been done. A section of the tunnel is shown in the accompanying engraving. The line is single track, stone ballasted, having new oak ties laid with 90-lb. rails. The tunnel proper is 775 ft. long, although the entire length of the work in question was 1,200 ft., there being, in addition to the tunnel, an embankment and entrance walls.

The walls and arch of the tunnel are of vitrified brick



The Patton Tunnel—L., E. & St. L. R. R.

and stone, the center of the arch being 21 ft. above the rails. The width of the tunnel is 15 ft., the walls being composed of six rings of brick. During the construction of the work, traffic on the road was not interrupted, the sides and roof of the tunnel being supported by temporary timbering. The track was temporarily supported on 12 in. x 12 in. stringers 10 ft. long between supports during the building of the invert. The bricks used were of the best quality, hard burned, paving brick, tested for 4,000 lbs. pressure per square inch without crushing. They were laid in cement mortar in proportion of one part of cement to two of sand. The cement was required to show 100 lbs. tensile strength per square inch without

breaking, seven days after mixing. The bricks were laid with the English bond having five stretcher courses to one header course. No headers were used in the arch. Concrete or clay was used for packing the space between the sides of the tunnel and the brick walls, the former being used for foundation beds for the walls and invert, when so specified.

The contractors were Patterson & Shipman, and they finished their part of the work about the 1st of July. The railroad company estimates that several thousand dollars have been saved by arching as compared to the cost either of making an open cut or building a new tunnel. During the work there were no accidents or delays to traffic, the result of the careful work done by Mr. Allen and the contractors.

The Wheless Electric Street Railroad.

The Westinghouse Electric & Manufacturing Co. has on exhibition in New York City a model of a new form of electric railroad, invented by Mr. M. Wheless, of Washington, D. C. There is no slotted conduit, and the current is not obtained directly from a continuous conductor, as is usual with such roads, but is taken from pins in the street between the tracks, by means of sliding shoes carried under the car.

Fig. 1 shows the position of the feeders and boxes, and of the terminal pins between the tracks. These pins are set in granite or terra cotta blocks about 7 in. square held in cast-iron cups spiked to the ties. The center pin of each group is used for the return current. The current is tapped from the feeders, through these pins, by means of sliding shoes of sufficient length to reach on pair of pins before leaving the preceding pair. The circuit is made for each section only while the car is over that section. This closing of the circuit is done automatically by means of an auxiliary battery carried in the car, and a pick-up magnet located in a feeder box, and shown in Fig. 3. This magnet is double wound, and when the armature is lifted by the battery current completing the circuit through the car motors, the motor circuit, passing through the magnet, serves to hold the armature tightly in place, until the car has passed to the next section.

The feeders are carried beside the track, or between the two lines of track, in suitable conduits, and are tapped at intervals, through cast-iron feeder boxes which in turn, are connected with the track terminals, as shown in Fig. 1. Here A^2 is that terminal through which the motor is put in communication with the return side of the service cable, the other two being used for the positive current. The connecting wires between the feeder boxes and track terminals are carried through suitable piping. Each feeder box contains two pick-up magnets mounted upon slate, one serving each track. The switch contacts are of carbon, "arcing" being prevented by the fact that the contacts are never broken while the current is on. The boxes are rendered waterproof by placing a dome-shaped lid over the pick-up magnets in the box, and filling the casing with oil.

Fig. 2 shows the arrangement of two of the track terminals and their connections. Fig. 3 gives clearly the arrangement of the pick-up magnet in the feeder box and its relation to the track terminals. The small storage battery in the car is shown at V , and the three track terminals at r , r^1 and r^2 . The arrangement of the circuit is too plain to need description.

This plan of serving the current to electric cars practically eliminates any chances of danger to life from electric shock, does away with electrolysis of water pipes, and makes bonding of track unnecessary. Its success depends chiefly upon the possibility of operating it under unfavorable climatic conditions, and upon the reliable action of the many connections and pick-up magnets.

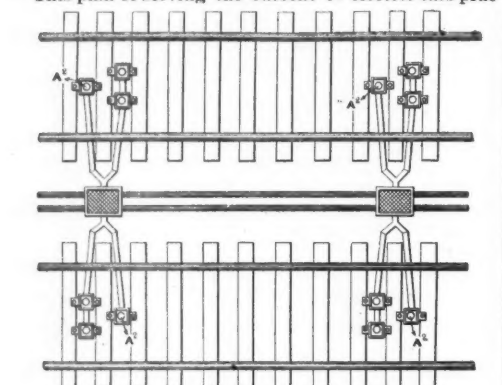
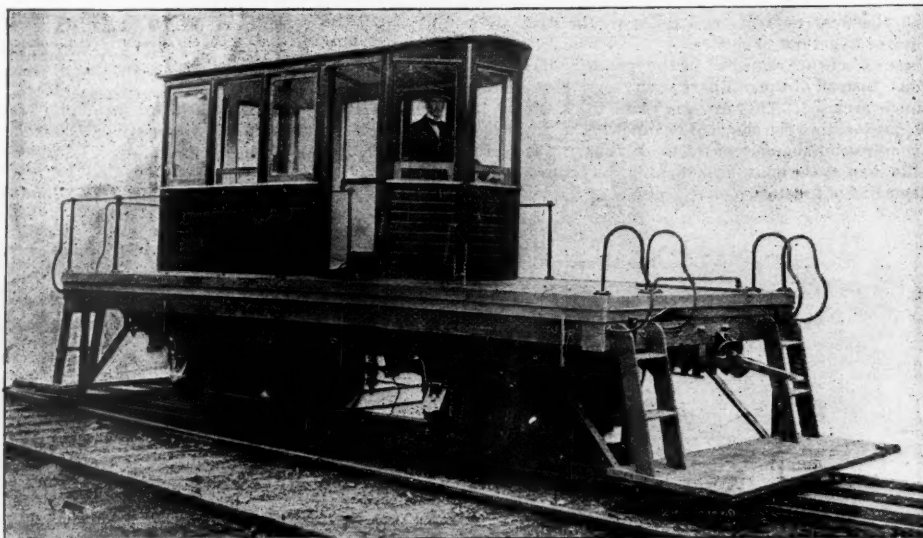


Fig. 1.

A line on this system has been in use for some time at the yards of the Westinghouse Electric and Manufacturing Co., at East Pittsburgh. The accompanying engraving, from a photograph, shows one of the motor cars used on this line. It is used for switching loaded cars in and out of the buildings, it being undesirable to use steam locomotives, on account of smoke and cinders. The motor will haul several cars as easily as a steam switcher. It has two 50-H.-P. motors, one on each axle, and the floor is covered with about 3 in. of cast iron to give the necessary adhesion. This system has also been installed upon a branch of the Eckington and Soldiers' Home Railroad, about one mile in length, situated upon North

Capitol street, beyond New York avenue, Washington, D. C., the system, however, differing from that which we have just described, in that the boxes are placed between the rails, instead of to one side, and short sections of flat conductor are used, instead of the pins. This line has been in operation during the past winter, and traffic upon it was not interrupted at any time by snow or ice. The contact shoes, while not rigidly supported, are sufficiently stiff to scrape off any ice which may form upon the track terminals, and should contact not take



Motor Car for Wheless System Electric Road in Westinghouse Yards at East Pittsburgh.

place at any one pin, which, however, is not at all likely, the momentum of the car would carry it over to the next pair. This line cost about \$35,000 per mile of double track.

Train Accidents in the United States in June.

COLLISIONS.

REAR.

2d, 5 a. m., on New York, New Haven & Hartford, at Rye, N. Y., a freight train ran into the rear of a preceding freight, wrecking 18 cars and injuring two employees who were asleep in the caboose. The foremost train had been stopped on account of a hot journal and had just started when the train broke in two. It is said that the flagman then went back at once, but before he had gone far, met the following train coming at high speed. The block signal operator at the entrance of the section, admitted the second train by a white flag, claiming that the electric lock was out of order and that the station in advance authorized the display of the white signal, but this is denied by the other signalman.

3d, on New York, Pennsylvania & Ohio, near Greenville, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, the collision occurring on a bridge 140 ft. long; the bridge was wrecked and 7 cars fell into the river. A brakeman was injured.

6th, on Philadelphia & Reading, near Locust Dale, Pa., a freight train descending a steep grade became uncontrollable and ran into the rear of a preceding freight, wrecking about 30 cars, which were piled upon both main tracks. Three trainmen were killed and 3 injured.

10th, on Cleveland, Cincinnati, Chicago & St. Louis, near Sidney, O., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 8 cars. Three tramps were killed and 4 injured.

17th, on Pennsylvania road, at Collins, Pa., a freight train descending a grade broke into three parts and the detached portions afterward collided, killing 2 tramps.

20th, on Manhattan Elevated, at Forty-fourth street

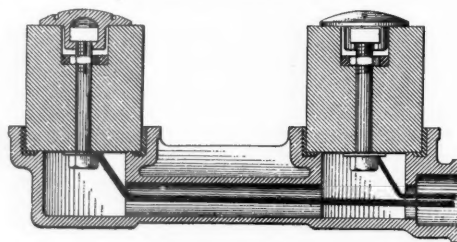


Fig. 2.

and Second avenue, New York City, a passenger train that had been stopped by an obstruction was run into at the rear by a following passenger train, derailing the rear car and badly damaging it.

24th, on St. Louis & San Francisco, near Pacific Mo., a freight train ascending a grade broke in two and the rear portion ran back into the head of a following freight train, wrecking engines and 16 cars. Three trainmen were injured.

27th, on Pennsylvania road, at Frazer, Pa., a freight train ran into the rear of a preceding freight, wrecking 7 cars. The engineman was injured.

And 14 others on 9 roads, involving 3 passenger and 20 freight and other trains.

BUTTING.

5th, on Denver & Rio Grande, at Lake Junction, Col., butting collision between a passenger train and a freight, wrecking one engine and several cars. One engineer was injured.

6th, on St. Louis, Iron Mountain & Southern, at Benton, Ark., butting collision of freight trains, wrecking 14 cars, which took fire and were burned up. Three trainmen were injured, and the remains of three men who were supposed to be tramps were found in the ashes.

8th, on Louisville & Nashville, at Dunham, Ala., butting collision of freight trains, killing one engineer.

12th, on Erie & Pittsburgh, near Newcastle, Pa., butting collision between a passenger train and a pay car train, wrecking both engines. Four employees were injured.

16th, 1 a. m., on Charleston & Savannah, near Hardeeville, S. C., butting collision of passenger trains 23 and 78, wrecking both engines and one mail car. Three tramps were killed and one engineman was injured. It is said that an operator reported the southbound train as having passed his station when, in fact, it had not arrived.

17th, on Southern Pacific, at Sixth and King Streets, San Francisco, butting collision of yard engines, injuring 3 employees, one very badly.

20th, 1 a. m., on Pennsylvania road, near Barre, Pa., butting collision of freight trains, wrecking both engines and 28 cars. Two employees and 2 tramps were injured. It is said that an operator who had been ordered to keep eastbound trains off this track neglected to do so.

21st, 4 p. m., on Philadelphia, Reading & New England, at Copake, N. Y., butting collision between a westbound passenger train and an eastbound freight train, wrecking the engines and several freight cars. Both firemen were badly injured and 6 passengers less seriously. It is said that the freight train approached the meeting point at uncontrollable speed.

CROSSING AND MISCELLANEOUS.

9th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Logansport, Ind., an engine standing unattended was started in some way, and collided with another engine, killing one employee and injuring another.

17th, on Central of New Jersey, near Wilkes-Barre, Pa., a car of coal escaped control on a steep grade, and ran at high speed to Wilkes-Barre, where it struck a yard engine with considerable violence.

25th, on Central of Georgia, near Milledgeville, Ga., collision between a work train and a local freight train, making a bad wreck. Three employees were killed and 3 injured.

And 7 others on 7 roads, involving 2 passenger and 10 freight and other trains.

DERAILMENTS.

DEFECTS OF ROADWAY.

9th, on Chicago & Northwestern, at Dixon, Ill., a freight train running at high speed was derailed by a

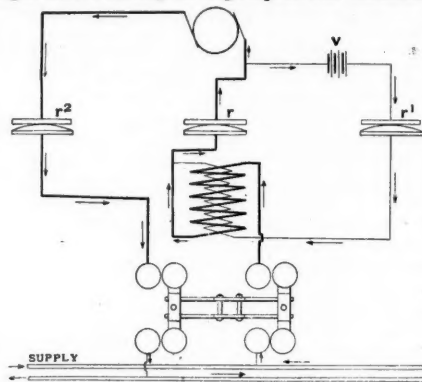


Fig. 3.

broken rail. One brakeman and the fireman were killed and the engineer was hurt.

12th, on Denver & Rio Grande, near Glenwood Springs, Col., a car in a freight train was derailed by spreading of rails and 3 other cars were pulled off the track. One car fell into the river and floated down stream some distance.

20th, 12:10 a. m., on Missouri, Kansas & Texas, near Eureka, Tex., a passenger train was derailed at a bridge weakened by a freshet and 3 cars were wrecked. Three passengers and 3 employees were injured.

DEFECTS OF EQUIPMENT.

2d, on Baltimore & Ohio, at Green Spring, W. Va., a freight train was derailed by a broken wheel, wrecking 20 cars. Three tramps were injured.

5th, 3 a. m., on New York, Lake Erie & Western, near Goshen, N. Y., an eastbound freight was derailed by a broken wheel, one car being thrown across the westbound track. A moment later a westbound train ran into it and 31 cars were wrecked. Two trainmen were injured.

5th, 9 p. m., on New York, Lake Erie & Western, near Darien, N. Y., a car in an eastbound freight train was derailed by the breaking of an axle, and the wreck, which

foiled the westbound track, was run into by another freight and about 50 cars were derailed and most of them wrecked. The wreck took fire, but the flames were subdued by farmers. Three trainmen were injured, one of them fatally.

11th, on Philadelphia & Erie, at Sargent, Pa., a freight train was derailed by a broken axle, making a very bad wreck, which took fire from a car of oil, and was mostly burned up. There were 15 tramps on the train, of whom at least one was killed; two other tramps and a brakeman were injured, and the rest of the tramps are unaccounted for.

16th, 4 a. m., on New York, New Haven & Hartford, at New Haven, Conn., passenger train running at considerable speed was derailed while running through a crossover track, and the engine was overturned. The engineer and fireman were slightly injured. The train was running too fast for the curve, and it is said that the air-brakes failed.

19th, on Baltimore & Ohio Southwestern, near Bedford, Ind., a freight train was derailed by a broken wheel and 14 cars were derailed. Several tramps were injured.

25th, on Pennsylvania road, near Bird in Hand, Pa., a freight train was derailed by a broken axle and 7 cars were wrecked. Two of the cars fell against a freight engine passing on the adjoining track, wrecking the cab. One brakeman was badly injured.

And 9 others on 7 roads, involving 9 freight trains.

NEGLIGENCE IN OPERATING.

11th, on Chicago, Burlington & Quincy, near Quincy, Ill., 7 freight cars in a mixed train were derailed while a running switch was being made and some of them fell into a creek. One brakeman was killed and 3 passengers were injured.

25th, on New York, Lake Erie & Western, near Secaucus, N. J., a freight train was derailed at a point where track repairs had taken out a rail and, it is said, failed to put out a suitable danger signal. The engineer was injured.

And 4 others on 4 roads, involving 4 freight trains.

UNFORESEEN OBSTRUCTIONS.

2d, on Burlington & Missouri River, near Oxford, Neb., a work train going to repair washouts caused by a cloudburst was derailed at a washout and the engine was overturned. Four employees were killed and one injured.

10th, 1 a. m., on Baltimore & Ohio, near Roseby's, W. Va., a train carrying a fire engine to Cameron, W. Va., and running at very high speed on account of the danger of destruction of valuable property at Cameron, was derailed and overturned by some obstruction on the track at a curve. The engineer and two of the men in charge of the fire engine were killed. Three other persons were slightly hurt. One report states that the obstruction was an animal.

14th, on Jacksonville, St. Augustine & Indian River, near Toco Junction, Fla., a freight train was derailed by running over some cattle, and the engine was derailed. The engineer was injured.

25th, on Carolina, Cumberland Gap & Chicago, near Aiken, S. C., a freight train was derailed and several cars wrecked. Three trainmen were killed. It is said that the cars were thrown off by a malicious obstruction.

29th, on Southern Railway, at Fullen, Tenn., passenger train No. 4 was derailed by a spike which had been placed upon the track. The engineer was killed and the fireman injured.

And 4 others on 4 roads, involving 1 passenger train and 3 freight trains.

UNEXPLAINED.

4th, 1 a. m., on New York & New England, at Fish-kill Landing, N. Y., a train carrying a show was derailed, and one of the passengers was injured.

4th, on International & Great Northern, at Lake, Tex., a passenger train was derailed and several passengers were injured.

And 19 others on 13 roads, involving 1 passenger train and 19 freight and other trains.

OTHER ACCIDENTS.

1st, on Lehigh Valley, at Buffalo, N. Y., an engine was damaged by an explosion in the firebox. The fireman and engineer were badly scalded.

20th, on Pennsylvania road, near Milford, N. J., the boiler of the engine of a mixed train was ruptured by a broken eccentric rod and the engineer was badly scalded.

21st, on Metropolitan Elevated, at the eastern terminal station, Chicago, a passenger train approaching the end of the track at too high speed ran into the buffer, and the cars were considerably broken. One passenger was cut by broken glass.

23d, on Atchison, Topeka & Santa Fe, near Nolan, N. M., the locomotive of a freight train was damaged by the breaking of a parallel rod. A brakeman was killed and the engineer and fireman injured.

A summary will be found in another column.

A Basis for Freight Rates.

BY WM. W. MULFORD.

Traveling Freight-Agent, Flint & Pere Marquette Ry.

The question of rates is the essential question of the railroad problem. Is there a business man who does not frequently wonder what will be the ultimate solution of this problem? The rapid growth of railroads, with the never-ceasing scramble for freight, urged on by the industrial struggle for supremacy between cities, has brought forth such a multiplicity and such a complexity of rates and charges that tariffs are in an intricate maze where all paths lead to chaos.

There is one fundamental law governing all freight rates, "charge what the traffic will bear." This law in its correct use is the secret of our success; in its misjudged and dishonest use, the source of endless wrong and expense. The object of this article is, first, to give a comprehensive definition of the true basis for freight rates, i. e., to suggest what the terms mean in actual practice.

The question of a correct and satisfactory basis for freight rates has been much discussed. Mr. Hadley gives some outline descriptions of the most important theories upon which tariffs in other countries have been formulated.* Such expressions as "cost of service," "value of service," "inverse ratio to the general utility

of service," etc.,* have been the cause of lengthy arguments. And, while it is claimed for each that it expresses the true basis, still, strange as it may seem, it is acknowledged that "charge what the traffic will bear" may express what each means. This is due to the "kaleidoscopic nature of freight rates." These arguments are of inestimable value, chiefly, in pointing out what the traffic will or will not bear under given conditions. There is one theory that covers all and is applicable to any and all conditions. Mr. Fink, the Alexander Hamilton of railroads, said: "The proper basis for railroad tariffs is cost of transportation." Before the full meaning of the practical application of this expression is clear, there are four points that must be understood.

First, our system of charging so much per pound per mile is misleading. Every railroad man knows that with the many changing factors it is impossible to ascertain the actual cost of transportation on any one consignment, and, if ascertained, it would be impossible to find the same combination of circumstances with regard to another consignment. We have *quantity, weight and distance*, they are among the chief factors. It is always possible to get the actual number, or weight, or distance, but we must know their relative value. Besides, there are other factors. There is not one factor nor any combination or ratio of factors ascertainable that is adequate to represent accurately the real cost of transportation. We can only find an average cost that will be approximate. We can ascertain the total cost for a given period and divide that into what factors we choose. The service rendered in the transportation of freight is measured in cents per pound per mile, which is of value to the railroad man as a comparative statement. Practically it is only used in this way; for rates, while they may be measured in this form, are not based on it. This is shown by the fact that the variation of less than one mill per ton per mile will frequently determine whether a road pays a dividend, and it is not unusual to cut rates 25 per cent. or even 50 per cent. If it be true that cost of transportation is the correct basis for estimating freight rates then we should use whatever will represent it most accurately. A standard carload has been advocated by some railroad men as the most accurate and most convenient basis on which to estimate the approximate cost. Factors apply here, however, that do not apply on small consignments. In these a standard package should be established. It will be much more accurate to estimate by the standard package than by the misleading system of so much per pound per mile.

In measuring cost of service in the United States mail system, distance is eliminated, and weight is used merely to secure uniform customs in order to facilitate handling, and as a limit established by law beyond which competition is prohibited. The law, charge what the traffic will bear, cannot act at random in the postal system. In the government mail it is applicable in two ways; first, on the total result, in deciding from the approximate cost, whether a lower rate will increase business, as for instance when the price of postage was reduced from three to two cents; second, by classification where it was considered that it would not produce the desired effect on letters but would on newspapers, therefore a discrimination was made and the reduction was to one cent only on the latter. This is discrimination but it is just. To maintain rates, it is necessary that the carrying of the mail should be a monopoly; and to maintain equal service for all that it be under the government. Here competition is maintained but it is controlled. It is kept where it acts to furnish the best possible service, and to reduce operating expenses to the lowest possible points. We hear of this or that road putting on a "fast mail train" and there is constant competition between the roads in giving the best service possible for the price paid in order to keep the business; besides it is always to the railroad's advantage to keep operating expenses as low as possible. As a matter of fact in railroading, charge what the traffic will bear, is worked out more carefully on the staple commodity than on the side issues; on the carload than on the small shipment. The systematizing of railroad business, particularly the use of a few classifications, has made this law less operative on package freight than on United States mail.

The second point is "joint cost." If dry goods and coal were charged alike the coal would not be moved. Mr. Hadley gives this illustration:

"To return a car empty is a great waste of power; in cases where this is necessary the rate must cover the cost of moving the car full one way and empty the other. For obtaining goods to fill such cars any rate is a paying rate when it covers the difference between hauling them empty and hauling them full—provided that such rates develop additional business which can be obtained on no other terms. For instance, suppose the cost of loading a car with wheat at St. Louis and hauling it to Philadelphia was \$40, and the cost of getting it back empty was \$15. To give any profit the rate would have to be over \$55, say \$60. The company sees that by offering a \$30 rate it can fill its car with a return load of coal, and it does so. What is the result? In the former instance the expenses were \$40 plus \$15 or \$55; the receipts \$60, the profit \$5. In the latter the expenses were \$40 plus \$40 or \$80; the receipts, \$60 plus \$30 or \$90, the profit \$10. Yet the average rate which secures this profit of \$10 is now $(\$60 + \$30) \div 2 = \$45$. An increase of 100 per cent. in the profits of the round trip has been accompanied by a reduction of 25 per cent. in the average rate charged."

Another simple case is that shown in the mining districts, where the only staple commodity of the railroad

is low grade ore, and cost of transportation must be the total cost of carrying the loaded cars and returning them empty. But, if the railroad can bring back provisions for the miners, either this profit is clear, or the total of profit from the provisions and the ore must be taken to meet the cost of transportation. If by taking the joint earnings it can lower the rate on the ore, thus letting it sell in the market for less and thereby cause greater demand for the ore, the railroad is following a conservative policy. And what matter to the miner whether he pay a little more freight on his provisions and less on his ore? Therefore, it follows that cost of transportation must be "joint cost." On this "joint cost" the management, by applying the rule, "charge what the traffic will bear," must make their tariff. This is "back-loading;" here any goods at any price will be clear profit, and sufficient clear profit will permit the company to lower the rate on the staple commodity. "Net freight" is on the same principle; if the train must run, a few boxes more will cost comparatively nothing, and here, too, any rate is a paying rate. It is obvious that "any fixed charge of so many mills per mile would make inoperative the law, charge what the traffic will bear, it would only be the old system of tolls,"* and would prevent making rates to develop business.

The third point is differential freight. It would at first seem that Mr. Fink's theory of differentials by which the great trans-continental rate wars were checked, and by which so many rate wars since then have been settled, was a contradiction of his statement that rates should be based on cost of transportation. But, to allow the weak line with the longest and most expensive haul to carry freight for a little less than the direct route, is in reality charging in accordance with cost of transportation on the cheapest, the direct route, and allowing for delay and inconvenience on the longer route.

The fourth point is, if "charge what the traffic will bear" is the true basis for freight rates, how is it possible that the true basis for rates is cost of transportation? When "charge what the traffic will bear" is applied it approaches as a minimum the point at which the traffic will not bear anything, for it is ascertained by deducting the price of producing from the market price, and when the price of producing exceeds the market price we have a loss to divide, in which case it is obvious the traffic will not bear moving. Therefore, though the much-discussed dividend factor, which is practically the elastic part of the fixed charges, be removed altogether, and business be so dull that operating expenses be cut down to one train a week, there is a point short of the minimum, above referred to, at which business must stop. This point is the lowest possible cost of transportation. "The railroad manager lowers rates just so long as it will increase gross earnings faster than operating expenses."

Therefore, since our system for figuring cost of transportation on small shipments of so much per pound per mile is misleading, and the approximate cost of transportation is the nearest that can be ascertained to represent actual cost, since "joint cost" must be taken into consideration, since the differential rates are primarily based on cost of transportation, and since the law "charge what the traffic will bear" should be checked somewhere before competition force it to drive the road, on which it is applied, into bankruptcy, then, the true basis for rates is cost of transportation, and it is in this broader and fuller sense that Mr. Fink used it.

In order to see how practical the statement is, consider the present predicament. We have, charge what the traffic will bear, as a governing law, and, the approximate cost of transportation, as our basis for freight rates. This is simply, "the same principles apply to railroading that apply to other business enterprises," but it is necessary to add that competition between railroads is usually keener than between other industries and that "receivership roads," the "rights of eminent domain," and "the duties of a common carrier" make the position of a railroad company unique.

The correct theory for basing rates on the first railroad was simple, and the history of the growth of tariffs is interesting; consider the thousands of miles of railroads spreading a close and intricate network, covering the entire land to its furthest corners, and the never-resting commerce rolling over this network, not in one but in all directions, and you realize how involved is the formation of tariffs. Systems essential for this immense business have been devised, but every attempt at systematizing has been based on discrimination. The position of a traffic manager is not a bed of roses. His "company" and "the public" are stringent masters. "He cannot serve two masters, for either he will hate the one and love the other, or he will hold to the one and despise the other." When he builds tariffs, when he allows, or refuses to allow, this or that special tariff or rate, when he signs this or that agreement, he finds vast questions to contend with, and the effects of his decisions are far reaching. Granting that each railroad and traffic manager is honest, and granting that each manager knows the needs of the communities and industries along his line, even then the man has yet to be born who can wield this power with perfect equity or perfect satisfaction.

The railroads have in a large measure brought their troubles upon themselves. At first they dictated rates to shippers; now the shipper feels that he must put his

* See, especially, "A Contribution to Railroad Rates," by F. W. Taussig, in *Quarterly Journal of Economics*, July, 1891; "National Consolidation of Railways," by G. H. Lewis, Chap. V.

* "Railroad Transportation," by A. T. Hadley, Chap. XIII.

* "Railway Transportation," by A. T. Hadley, Chap. I.

(Continued on page 502.)



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The New York Central announces that thousand-mile tickets will soon be put on sale at 18 principal stations, to be sold at \$20 each, and to be good on the New York Central proper, including branches and the Adirondack Division, but not on the Harlem or the Putnam Division. Neither are the tickets good on the Carthage & Adirondack; and the Rome, Watertown & Ogdensburg and the West Shore are evidently omitted also. As the law recently passed to compel the use of tickets of this kind does not apply to those portions of the New York Central on which the regular local rate is two cents a mile, it is somewhat difficult to see just what scheme was followed in issuing these tickets; but the restrictions placed upon their use are so numerous that it is quite possible that travelers will not use them a great deal. In the first place agents at small stations will have to write to headquarters before they can get a ticket. The tickets are not transferable, and the name of the buyer must be written in each book three times. Coupons will not be accepted on a train, except from stations where there is no ticket agent, but must be presented at the office and exchanged for a ticket. These tickets are of special form, making additional complication for the agent, and for all but the most important stations the agent must use a book ticket, which involves considerable delay in issuing. To fill out a book ticket the agent must stamp the ticket and two stubs and must note on all three the number of the mileage book. On the whole it looks as though the company had so complied with the law that the drummers will get little if any satisfaction out of it, so far as the Central is concerned. These tickets do not conform to the spirit of the law, or, at any rate, to the notions of the men who procured its passage, and we are not sure that they conform to the letter of the law either. At the same time the reduction in fare on some of the lines is probably sufficient to induce passengers to put up with some inconvenience. We do not blame the road for taking all reasonable means to avoid the issue of ordinary mileage tickets, for they give the public very little benefit that could not be given just as well in some better way, while as a means of cheating they are one of the best contrivances ever discovered by dishonest passengers and conductors.

We record in another column the beginning of a new organization of mechanical officers of the railroads entering Chicago. This new association or club will take for its field the strictly business matters affecting the lines entering Chicago. Questions come up from time to time which an organization of the mechanical representatives of these lines, subject to the call of its chairman, at the request of the parties in interest, could settle promptly and advantageously. These are matters which come more directly under the head of executive policy than under that of purely technical investigation. They might not come up once a year; but, again, they might come in bunches of seven in a week. They are matters which, while not

really beyond the scope of the Western Railway Club, might be more satisfactorily handled by a small, compact organization such as that proposed. It is not the intention that this new association shall rival the Western Railway Club, or assume any detail of the latter's customary work. It is simply proposed to have a local organization which can quickly and effectively act, on short notice, upon questions of policy where uniformity of action is desired, after the manner of the local associations of general managers and of general superintendents. Aside from the considerations which favor the new organization is another—freedom of speech. It is well known that in an open club meeting one often wishes to say things which are better left unsaid. The condition is identical with that at the annual conventions, where the talk on the verandas, in select, quiet circles brings out statements that never can appear in the reports of the discussions on the convention floor. There are several reasons for this condition. One is that many men, full to the brim of good ideas and of knowledge of present practice and of reminiscences of past practice, simply cannot get up before an audience and talk and let the richness of their knowledge flow. Another reason for reticence in full club and convention meetings is that, as intimated above, there are always some things that are better left unsaid if a reporter or a mixed audience is present. At the private meeting in Chicago, for instance, where this new club was proposed, there were things said that probably never would have been said at a railroad club meeting or at one of the mechanical conventions. The new association has a fine field of work before it; not a clearly defined field as to extent or even as to character, it is true; but on almost any day it will be found to be "a good thing to have in the family" of Chicago railroads.

The general feeling is now exceedingly hopeful in all commercial circles, and the orders for new cars and locomotives and other railroad supplies indicate that railroad officers are practically unanimous in the view that the autumn business will be good. The universal strengthening of confidence during the past two weeks is based, of course, upon the increasing assurance that the corn and wheat crops are nearly out of danger from drouth or frost. Our Chicago correspondent says:

"Heavy rains during the past week, generally throughout the grain states, have apparently placed the corn and wheat crops beyond the probability of damage, and the railroads are looking forward to a crop movement which will equal the phenomenal movement of 1889. The corn crop in Kansas is estimated at 150,000,000 bushels with a total cessation of rain from now on, and if a moderate amount of rain falls it will reach 275,000,000 bushels or more. Recent rains in Texas have so thoroughly soaked the soil that, considering the lateness of the season, it is hardly possible that any hot winds will blow over Kansas to scorch the corn. Texas is growing double the amount of corn ever attempted heretofore, and the same is true of the Territories. The crop in Nebraska is also reported to be practically safe. All the roads running through the northwestern wheat belt report that the outlook is favorable for a heavy crop. Missouri is the only state badly in need of rain. The nearby states are all well soaked by the recent rains, and good crops are assured. From the best consensus of opinion obtainable the prognostication that the granger roads will be taxed to the utmost this fall to move the crops appears to be well grounded."

Our Northwestern correspondent writes:

All the railways that traverse the spring wheat belt of the Dakotas and Minnesota are preparing to handle more grain than ever before. The indications now are that there will be a wheat crop in the three States of not less than 140,000,000 bushels, or, say, 105 millions to go out by rail. Of flax there will be a large crop, and the potato crop will amount to over 35,000,000 bushels, there having been an enormous increase in acreage. Of rye, barley and oats there will be a total of not far from 110,000,000 bushels; and of corn, which Minnesota and North Dakota are this year raising for the first time in quantity, about 25,000,000 bushels.

The harvest is well under way; that of barley and oats is nearly completed in most of the Northwestern States, that of flax has begun, and the wheat harvest will be general by the close of this week. It has already been started in the southern districts. It has been estimated that not less than 12,000 to 15,000 men would be needed for the harvest, and thousands of them are going into the country. Every train from the cities is loaded with men, most of whom travel free, the numbers being so great that trainmen are utterly unable to cope with them. Wages are now \$1.50 a day and board, but may decrease, as the supply promises to be in excess of the demand, especially near the centers of population.

The Commercial Efficiency of Heavy Locomotives.

The Southern Pacific Railroad Company has recently put into service a 12-wheel locomotive weighing on drivers 146,500 pounds. This engine is being compared with other 12-wheelers built by the same firm,

the Schenectady Locomotive Works, weighing 109,700 pounds on drivers. The total weights, without tenders, are 173,500 and 139,000 pounds, and with tenders 266,300 and 205,000 pounds. Thus, 55 per cent. of total weight of engine and tender is useful for adhesion in the larger engine and 53.5 per cent. in the smaller, so that, so far as the dead weight is concerned, neither has the advantage, provided, of course that the boiler, in each case will make steam enough to supply the necessary cylinder power to use the full adhesion. Therefore, although the heavier engine will haul more cars it will give less dead weight per ton of total load.

The tests of these engines (see table) show that the heavier hauls an average load of 405.8 tons of cars, or 539 tons total train. The lighter hauls 286 tons of cars, or 389 tons total train. The heavier hauls 7.4 tons of total train for each ton on drivers and the lighter 7.1 tons for each ton on drivers, working on the same grades. The heavier locomotive hauls about

PERFORMANCE OF ONE HEAVY, ONE LIGHT, AND ONE COMPOUND 12-WHEEL LOCOMOTIVE ON THE SOUTHERN PACIFIC RAILROAD.

	Heavy 12-wheeler.	Light 12-wheeler.	Light 12-wheeler, compound.
Percentage of total weight of engine and tender useful for adhesion.....	55	53.5	52
Tons of load of total train including engine and tender, hauled per ton on drivers.....	7.4	7.1	7.0
Coal per ton-mile of cars and lading used on round trip, —pounds.....	.34	.39	.35
Saving in fuel over other locomotives by the heavy 12-wheeler on round trip, —per cent.....		12.7	4.2
Coal per ton-mile on up grade trip, cars and lading, pounds.....	.53	.61	.34
Saving in fuel over the other locomotives by heavy 12-wheeler on up grade trip, —per cent.....		15.8	1.15
Water per ton-mile of cars and lading, round trip, —pounds.....	2.18	2.18	1.97
Saving in water over the other two locomotives by the heavy locomotive on round trip, —per cent.....		4.6	5.8 loss
Water per ton-mile of cars and lading, up grade trip, —pounds.....	3.28	3.50	3.12
Saving in water over the other two locomotives by the heavy locomotive on up grade trip, —per cent.....		6.4	5.5 loss
Saving in water over the other two locomotives by compound on round trip, approximate, —per cent.....	5.8	10	
Saving in water over other two locomotives by compound on up grade trip, —per cent.....	8.5	15	
Saving in evaporation of water per pound of coal over other two locomotives by the compound on round trip, —per cent.....		9.2	10.4
Saving in evaporation of water per pound of coal over other two locomotives by the compound on up grade trip, —per cent.....		11.2	9.6
Heating surface total square feet.....	2,355	1,884	1,884
Grate area, square feet.....	35	31	31
Coal used per square foot of grate per hour, on round trip, —pounds.....	55.5	50.5	43.5
Coal used per square foot of grate per hour, up grade trip, —pounds.....	73.5	68	56.5
Water evaporated at boiler pressure per square foot of heating surface per hour, round trip, —pounds.....	5	4.5	4
Water evaporated at boiler pressure per square foot of heating surface per hour, up grade trip, —pounds.....	6.8	6.2	6.8

the same load in proportion to its weight as the lighter, so that if there is a saving in fuel from using the heavier locomotives it must come from better combustion and evaporation, less radiation and decreased internal friction of engine per ton-mile.

It will take 1.4 times as many of the lighter as of the heavier locomotives to haul the same tons per month over a given division of the road. This gives a large reduction in wages and will reduce the coal per ton-mile somewhat, as the losses of heat outside of that expended to haul the load itself are greater with 1.4 locomotives than with one locomotive. Some of the smaller losses of heat are constant and are in proportion to the number of engines used and independent of the load.

Referring now to the actual fuel tests made of these engines, we find some interesting results. The data may be taken, perhaps, as roughly comparable, although that from the lighter engines was gathered in July and August, 1891, while that from the heavier engine was taken in March of this year. The coal is said to be about the same in quality, but that cannot be positively stated without figures from a thorough examination.

The coal used per ton-mile was .39 pounds with the lighter engine and .34 pounds with the heavier. A compound (Schenectady) in the same service and weighing about the same as the lighter engine used .35 pounds of coal per ton-mile. The saving of fuel was 12.7 per cent. over the simple engine and 4.2 per cent. over the compound. This was between Sacramento and Truckee, round trip. Up the grade from Sacramento to Truckee the coal per ton-mile was .63 pounds for the lighter, .53 pounds for the heavier and .54 pounds for the compound. The saving in fuel was 15.8 per cent. over the lighter simple engine and 1.15 per cent. over the lighter compound.

Putting these figures on a car-mile instead of a ton-mile basis, the compound beat the heavier simple engine 15 per cent. on the up-grade trip, and was equal in performance to the heavier locomotive on the round trip. This shows once more the fallacy of the car-mile basis.

It is now interesting to go farther into the performance, and see why it is that the heavier engine was more economical. It has been seen that the greater hauling power does not decrease the losses due to the dead weight hauled. It is said that the water used per ton-mile of cars for the round trip with the heavier engine was 2.03 pounds, and for the up-grade trip, 3.28 pounds. With the lighter simple engine these figures were 2.18 for the round trip, and 3.50 for the up-grade trip. With the compound they were 1.97 for the round trip and 3.02 for the up-grade trip.

The saving in water for the heavier engine over the lighter simple engine was 4.6 per cent. for the round trip and 6.4 per cent. for the up-grade trip. The compound beat the heavier simple engine in water, used 5.8 per cent. for the round trip and 8.5 per cent. on the up-grade trip.

These figures would show a saving of the compound in water over the simple engine of the same size amounting to about 10 per cent. for the round trip and 15 per cent. for the up-grade trip.

It is seen that, although the heavier locomotive saves in fuel 12.7 per cent. on the round trip and 15.8 per cent. on the grade trip, over the lighter simple engine, and 4.2 per cent. on the round trip and 1.15 per cent. on the grade trip over the lighter compound, yet the saving in water was far less. This appears from the data which give the saving in water for the heavier engine over the lighter simple as 4.6 per cent. for the round trip and 6.4 per cent. for the grade trip, leaving $12.7 - 4.6 = 8.1$ per cent. for the round trip and $15.8 - 6.4 = 9.4$ per cent. for the grade trip, to be accounted for in some other way than by the saving in water per ton-mile.

In the case of the compound the saving in water was 5.8 per cent. for the round trip and 8.5 per cent. for the grade trip *in favor of the compound*, while the saving in fuel was against the compound. This leaves, approximately, 10 per cent. on the round trip and 9.7 per cent. on the grade trip, saving in evaporation of water by coal to be accounted for.

Turning now to the results of the tests, it is found that the heavier locomotive evaporated 6.13 pounds of water per pound of coal on the round trip, and 6.14 pounds on the grade trip. The lighter simple engine evaporated 5.6 pounds and 5.5 pounds respectively, and the compound 5.55 and 5.6 pounds. The saving due to the better evaporation of the heavier engine was 9.2 per cent. on the round trip and 11.2 per cent. on the grade trip over the lighter simple engine, and 10.4 and 9.6 over the lighter compound.

From these results it appears that the saving of the larger locomotive is wholly accounted for in the better evaporation, and if this large engine was made compound and given the same good clean boiler there would be a further saving in fuel resulting from the saving in water, amounting to at least 5.8 per cent. and 8.5 per cent. for the two sets of trips, as shown by the actual results.

The heating surface of the lighter locomotives, simple and compound, is 1,884 sq. ft., that of the heavier locomotive is 2,355 sq. ft., or an increase of 25 per cent. The grate area of one, the heavier, is 35 sq. ft. and of the others 31 sq. ft. The increase of this dimension is, then, 13 per cent. The rate of combustion per square foot of grate per hour averages for the round trip 55.5 lbs. for the heavy simple engine, 50.5 lbs. for the lighter simple and 43.5 lbs. for the compound. On the grade trip the rate is, for the heavy simple 73.5 lbs., for the lighter simple 68 lbs. and for the compound 56.5 lbs.

These figures show that the rate of combustion is higher for the heavier simple engine than for the two lighter locomotives, which are less economical. The explanation of the fact shown by the data given, namely, that the boiler with the more forced grate is more economical must be found in the condition of the boiler, the method of firing, in the grate and smokebox arrangements or in the rate of evaporation per square foot of heating surface.

The final comparison, so far as the actual dimensions and data will allow, rests with the water evaporated per square foot of heating surface; if this is not enough less with the larger locomotive to indicate the reason for the better economy of the larger boiler, then, one must rest until more data are collected and accept the fact of better economy without knowing reasons therefore.

The water evaporated per square foot of heating surface was approximately as follows: On the round trip, for the heavy engine, 5 pounds; for the light simple, 4.5 pounds; for the compound, 4

pounds. On the grade trip for the heavy engine, 6.8 pounds; for the lighter simple, 6.2 pounds, and for the compound, 6.8 pounds. These figures are from 25 to 75 per cent. higher than are obtained from water tube boilers in stationary boiler practice, but are not so high as the common practice on locomotive. They show that there is no explanation for the better economy of the larger boiler to be found in the reduction of the forcing, and, therefore, that the saving of the larger boiler must be found in the firing, in its condition with respect to scale and mud, or in the grate or smokebox arrangements.

It may be said that this is a severe analysis of the data offered, but results that will not bear analysis such as this are not to be trusted too far. In this case, the only safe conclusions are that the heavier engine will save wages by hauling more cars, and if the better working or operated boiler had been on the compound locomotive, or if the large engine had been compounded, there would have been a large additional saving.

The rate of combustion per square foot of grate in these tests is not high, and that accounts for the good evaporation obtained in comparison with other locomotive tests.

Railroad Organization.

II.

We gave week before last a short review of the report on the organization of railroads in English speaking countries prepared by Mr. Harrison, General Manager of the London & Northwestern, for the International Railroad Congress. We shall now take up the report on the non-English speaking countries made by Mr. Duca, General Manager of the Roumanian State Railroads. Mr. Harrison's task was simple compared to that of Mr. Duca. He had to deal with practices that had grown up on the basis of administering a private property for business purposes. Private ownership of railroads is the rule where the English race prevails, and there the railroads are worked to make money for their owners, and not primarily for the good of the community. But, as we look at it, the good of the community is the inevitable result of the successful administration of private enterprises. Mr. Duca had to deal with quite different conditions. He had to consider the administration of railroads worked to promote the theoretical good of the state, and into this method of working must enter considerations of military usefulness, government control of classification and rates, the efforts of the Government to promote safety, and in general to take care of the people, as well as to make money enough to ultimately cancel the debt of the railroads. Naturally, under these conditions the theorist has come in with elaborate, minute and inflexible systems. Obviously, too, the bureaucrat has entered with his power to do what he thinks is right, regardless of the wishes or policy of the customer. Mr. Harrison dealt with railroads as administered by men who went into the business of making and selling transportation as any other manufacturers or traders would make and sell their wares. Mr. Duca had to deal with railroads as organized and administered by men who feel called upon to do good to the people at large in their own way, regardless of whether or not the people like to be benefited in that special way.

The first system considered is that of Germany, the most perfect example in the world of organization under state control. We have quite recently (May 24) given an account of the Prussian State railroad organization, as it has existed for 14 years, and as it was modified this year. The old organization, which went into force April 1, 1880, and which worked 17,502 miles of railroad, was directly under the Minister of Public Works, under whom were 11 directorates and 75 operating bureaus. The reorganization this year abolished the operating bureaus, and concentrated the power in 20 directorates, 9 new ones having been created. The new organization enabled the Minister to dispense with 3,050 employees, of whom 380 were higher officers.

The Minister of Public Works had, and still has, general supervision, and different sections deal with technical questions, with traffic questions, questions of construction, and finally supervision of private railroads, and general administrative questions on the state railroads. The Minister approves in general plans and estimates for new lines, and decides by what department these lines are to be built. He fixes the maximum salaries to be paid during construction, and approves of contracts for sums over \$12,500, if there has not been a public tender, and sums over \$37,500 if there has been a public tender. These are contracts for material and rolling stock. Contracts for works are approved by the directorates, whatever the amount involved. The Minister also deals with alter-

ations in working organization and regulations; with changes of time-tables; with International tariffs; with alterations of existing rates and the application of new ones; and decides on alteration of standards of rolling stock and apparatus. He nominates, by royal decree, superior officers, and determines the transfer and increased salaries of these officers.

The directorates now actually operate the railroads and as a rule prepare all plans for new construction and for improvements. At the head of each directorate is a President, who has charge, on the average, of 870 miles of railroad. Under him is a staff of administrative and technical officers, whose duties are assigned to them by the President, who is individually responsible for the work of his directorate. Each President has one official of high rank of the class called administrative and one of the technical class, whose opinions are to be heard in all important matters. What we should call the divisions of the directorates are called inspections—a construction and operating inspection averaging about 62 miles, a locomotive inspection from 186 to 310 miles and a traffic inspection from 124 to 248. The duties of the inspectors are essentially those which would be performed by division officers at the head of like departments in our own country. All of the railroads of Prussia have the following joint offices: A central office at Magdeburg for the distribution of rolling stock; another central office at Magdeburg for settling car accounts; an office at Hanover for settling traffic accounts with foreign railroads, an information office at Berlin and a commercial agency at Milan.

In Belgium the railroads are now constructed and supervised through the state railroads, the administration of which is under the Minister of Railroads, Posts, Telegraph and Marine. Under the minister are five administrators, with supreme control over the various branches of service. Each administrator manages one or more branches, and all joint questions are dealt with at stated periods by general meetings of the five. The decisions of this committee are subject to the approval of the minister. Immediately below this committee are the superior inspectors, of whom there are four joint inspectors for way and works, locomotives and rolling stock, traffic, accounts and stores. Independent of the committee of five and of the superior inspectors, there is an administrative council, made up of the administrators, the inspectors general, administrative directors and such heads of departments as may be summoned by the president. The railroad system is divided into six branches, administered by the five directors or administrators. These six branches cover general service, way and works, locomotives and rolling stock, transportation, traffic, accounts and stores. These branches are again subdivided for local control; for instance, the way and works branch is divided into 10 groups, each with its engineer-in-chief and sufficient staff. The locomotive and rolling stock branch is divided into five districts, each with an engineer and staff. The operating branch is divided into 10 groups, each with a divisional chief, with his assistants, inspector, etc.

In Spain the railroads are under the control of the Minister of Public Works. There are two officers in supreme charge, one dealing with concessions and construction and the other with operation. There is, moreover, a council composed of engineers and inspectors-general. The Spanish system is divided into six divisions. At the head of each is an engineer-in-chief with a staff of civil engineers, locomotive engineers and drivers, inspectors, etc.

All of the Spanish railroads, which at the beginning of 1894 comprised 7,036 miles, are conceded to 44 companies, the most important being the Northern, the Madrid-Saragossa and the Andalusia. The organization of the Northern consists of a council of administration composed of 16 members with headquarters at Madrid; a committee of seven with headquarters at Barcelona and a committee of 10 at Paris. At Madrid there are a general manager, an assistant manager and a deputy manager, and under these are 14 subdivisions of service which cover the whole administration. The other large organizations are quite similar.

In France we find the most highly developed organization. The greater part of the French railroads belong to six great companies, over all of which, however, the State exercises control. The State control is through the Ministry of Public Works, assisted by a director of railroads. This director of railroads is at the head of the central administration at the Ministry of Public Works, which has four divisions and nine offices. The control of each of the great lines is intrusted to an inspector general, who is assisted by four engineers in chief to whom he delegates his powers; as, technical working, way and buildings, construction, central control. A chief inspector in control of what we should call traffic is likewise at

the head of a department under the inspector general. The State control is still further exercised by local officials, each railroad system being divided into districts and each district having an engineer in control of technical working and another in control of ways and buildings. Under these engineers are accountants and other subordinate officers and clerks. Through the Ministry of Public Works control is exercised over construction of new lines, agreements with private companies, tariffs and rules as to regularity and safety in working. The Minister, moreover, may require the dismissal of any agent of the company, whatever his rank. The companies must submit to the officers of the government all books and correspondence and all vouchers, and must give access to the offices, the workshops, the stations and the treasuries. This scrutiny is exercised through commissaries general, which officers may be present at all general meetings of stockholders, and may require that their remarks be inserted in the minutes. They may require also the immediate meeting of Boards of Directors to consider suggestions which they have to offer, and at these meetings the commissaries general are present.

For each of the railroad systems there is a committee under the presidency of the inspector general. This committee includes the commissary general of the line, the inspector of finances and the heads of departments of technical and traffic control. This committee meets at least once a month and gives its opinion on all questions concerning control, which are submitted by the Minister or by the inspector general. There is, furthermore, a consultative committee composed of 26 members appointed by decree and four members ex-officio. These include members of Parliament, members of the Council of State and of the Chamber of Commerce at Paris, representatives of the Corps of Roads and Bridges and of the Corps of Mines; also of the Ministry of Finances, of Commerce and of War; also of the Directory of Posts and Telegraph. This committee is consulted with regard to tariffs, interpretation of laws and regulations, schedules of maximum rates, relations of the companies to each other, complaints and requests as to running of trains, establishment of stations and, in fact, the organization and general conditions of the railroads. There is then a formidable committee on technical working and a commission of superintendents of financial management. It will be observed that this is a vast machinery, but it is simply the machinery of State control. The actual organization for working the railroads is illustrated by the case of the Eastern Railroad.

The Eastern Railroad proper covers almost 4,000 miles. It is administered by a board of 20 directors appointed by the shareholders at the general meeting. The board elects its chairman and vice-chairman and meets at least once a month, and has full power over the affairs of the company. In fact, the board appears, from Mr. Duca's account, to take more minute cognizance of the administration than is common in this country—going into tariffs and into rules of working. It is subject in these last particulars to the approval of the Ministry of Public Works. Estimates of receipts and expenditures as prepared by the board must also be submitted to the Ministry. The board appoints and discharges all servants and officials of the company and assigns their duties and salaries.

It is said that, as a matter of fact, the board delegates a great part of its powers to the General Manager (directeur). It has an executive committee of seven members, the members of which serve individually week by week, by turns, auditing the accounts at the central office and scrutinizing financial affairs in general. The duties of the General Manager, of course, are subdivided among his subordinates, and the limitations of the powers of these subordinates vary according to the individual and the occasion. For practical purposes the service is divided into four departments: First, central administration, including the office of the secretary, the auditor and the department of stores and medical service. Second, central administration, covering traffic and train movement. Third, cars, locomotives and workshops. Fourth, the service of the line and new works. The last three departments are subdivided into districts. In the operating department, for instance, there is a manager who has under him two engineers in chief, one of whom deals with what we should call traffic, the other with transportation. The rolling stock and locomotive department has at its head an engineer in chief who has two assistant engineers in chief. The permanent way department has an engineer in chief at its head with an assistant engineer in chief. For operation the system is divided into seven districts, each having a chief inspector. These report directly to the head of this department, called by Mr. Duca, the traffic manager, "traffic" being used rather as we should use the word "transportation." These inspectors have charge

in their respective districts of the whole business of transportation.

The car department is divided into five sections, each with an inspector whose rank appears to be the same as that of the inspectors in the transportation department. The locomotive department is also divided into five sections, but the rank given to the members of that department is not specified in Mr. Duca's account. The locomotive and car districts are not always the same either as to headquarters or as to territory covered.

Mr. Duca gives in tabular form the system of organization of each one of the great companies, but explains in detail only that of the Eastern, from which the others do not differ greatly.

In Holland the railroads are worked by four companies: The Dutch Company, which builds and works its own lines and some of those built by the state; the Dutch State Company, which does not build, but works lines constructed by the state and by private enterprise, and two minor administrations, the Dutch Central and the Brabant Northern German.

The first of these companies works 773 miles. The control of the state is, however, nominal, and is carried out by a general commissioner who visits the offices once a week to get information as to the general progress of the business. The board of administration is composed of five members representing the shareholders. These choose a chairman and an administrator from their own number, the latter of whom has the functions of the general manager. One of the members of this board controls the secretary's office and another the treasurer's. The organization as a whole seems to be simple and compact. The four administrations have maintained a joint service, dealing with the distribution of cars and with car accounts. It is said that this joint service was to have been superseded Aug. 1, 1894, by four officers, these to be under each of the four administrations.

The Netherlands State Railroad works 1,062 miles. This is managed by a general manager under a board of directors, elected by the stockholders. The general manager appoints the heads of departments.

In Italy there are 8,518 miles belonging to the state and 2,624 belonging to private companies. The state lines are worked by three contracting companies. We will glance only at the system of the Mediterranean Company. At the head of this is a board of administration composed of 23 members, meeting once a month. This board appoints a general manager, subject to the approval of the government, a deputy general manager and the heads of departments. It confirms, also, the appointment of the permanent staff. It delegates to a committee of five power to deal with current questions. This committee meets once a week, and its heads serve in turn, to deal with questions which do not require the attention of the full board or committee. The general manager is supreme under the board. The operating work is carried on by a head and sub chief of department and by five chief inspectors, each at the head of a district.

In Russia the railroad system had, at the time of writing the report, a length of 21,889 miles, of which 12,367 were worked by the state and 9,522 by private companies. Of the state railroads, 10,156 miles are under the control of the Minister of Lines of Communication; 1,315 compose the system of the Finland railroads, under the control of the Senate of the Grand Duchy of Finland, and 896 miles constitute the Trans-Caspian system, under the Ministry of War.

The organization for control through the Ministry of Lines of Communication is very formidable. First there is a council of railroads. This is composed of 12 state officers and two representatives of the agricultural and metallurgical industries. This council deals chiefly with the legal aspects of railroads. Then there is the Council of the Ministry, which takes into consideration matters of purchase or condemnation of real estate, also matters concerning the staff, such as the settlements and superannuations, proceedings against officials, etc. Then there is the council of engineers, entrusted with the study of technical questions of general interest, schemes, estimates, etc., which involve great expenditure extending over a considerable time. This council takes up designs of rolling stock, bridges and important buildings, schemes for junction stations, termini and first-class stations, and other technical schemes submitted by the council. There is the department of railroads, including five divisions and three technical advisory committees; and besides this there is the central administration of state railroads. These bodies are formidable in numbers, the latter being made up of official delegates from the various departments, and it usually sits once a week, and it seems to deal with the whole ordinary administration of a railroad. But so does the department of railroads, and it is quite im-

possible from Mr. Duca's report to separate their functions.

For actual purposes of operation the state system is divided into groups, managed by divisional officers. These officers evidently control the actual workings of their divisions, but at each division of headquarters there is a council of superintendence, composed of the heads of departments of line, buildings, transportation and locomotives and shops. This council examines contracts and purchases, decides on the sale of scrap, etc., inquires into accidents and measures of safety, deals with matters of punishment and discipline and charitable assistance, and with other questions which the divisional superintendent thinks fit to submit to the council.

Finally, there is an inspection of railroads under authority of the Ministry of Lines of Communication, in which department there are an inspector general and 12 inspectors. This institution supervises the conduct of the service of all the railroads of the empire and submits proposals for improvement.

The Ministry of Finance has control of matters relating to tariffs. Then there is a controlling department, being a division of the accounts department, which appears to have some supervision of all accounts.

The private railroads are conducted by boards elected by shareholders, these boards being responsible to the shareholders and to the government. There are divisional directors appointed by the government from among candidates nominated by each company, who are considered as officers of the State and form part of the staff of the Ministry of Lines of Communication. On the technical side the administration of these private railroads is subordinate not to the shareholders but to the Ministry of Lines of Communication, to which it is responsible for the general condition of the line, engineering and other work, buildings and rolling stock.

Mr. Duca has passed in review the systems of Germany, Austria-Hungary, Belgium, Denmark, Spain, France, Holland, Italy, Norway, Portugal, Roumania, Russia, Servia, Sweden and Switzerland. We have selected only a few of those which seem to be the most important, but the whole document is important to the student, being, as it is, very detailed.

In concluding his very elaborate report Mr. Duca devotes several pages to general considerations of the whole subject, which he summarizes by saying: "Whether it be a question of railroads worked by private companies or by the state, we must not lose sight of the fact that they both alike constitute undertakings which are essentially commercial. They must therefore be administered as such, and though superior authorities are necessary, their multiplicity is often only an obstacle to the efficient working of the services and to a rapid dispatch of business." He pays a tribute to the general devotion of the railroad administration to the public good, to the eminent services that they have rendered to all branches of human activity, and says, "Is it not permissible, seeing that liberty is now the universal cry, to formulate the wish that a certain liberty of action should be given to them also, not in their own personal interests so much as in the interests of the public in general?"

Mr. Duca is very guarded in drawing any comparisons between railroads subject to state control and those enjoying greater freedom, but the sentences that we have quoted indicate, we think, what his opinions on this subject are, and what he would be likely to say if he were living and working in one of the English-speaking countries.

June Accidents.

Our record of train accidents in June, given in this number, includes 40 collisions, 55 derailments and 4 other accidents, a total of 99 accidents, in which 35 persons were killed, and 83 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

	COLLISIONS:	Rear.	But-ting.	Cross-ing and other.	Total.
Trains breaking in two.....	8	0	0	0	8
Misplaced switch.....	1	0	0	0	1
Failure to give or observe signal.....	2	2	1	0	5
Mistake in giving or understand-ing orders.....	0	0	0	0	0
Miscellaneous.....	5	1	0	0	6
Unexplained.....	6	5	4	0	15
Total.....	22	8	10	0	40

DERAILMENTS.	
Broken rail.....	1
Loose or spread rail.....	1
Defective bridge.....	1
Broken wheel.....	1
Broken axle.....	1
Broken truck.....	1
Broken car.....	1
Failure of airbrake.....	1
Misplaced switch.....	2
Track repairers.....	1
Bad loading.....	1
Runaway.....	1
Bad Switching.....	1
Animal on track.....	3
Washout.....	1
Malicious obstruction.....	4
Accidental obstruction.....	1
Unexplained.....	21
Total.....	35

OTHER ACCIDENTS.

Explosion.....	1
Broken side rod.....	1
Breakages of rolling stock.....	1
Other causes.....	1

Total number of accidents..... 99

A general classification shows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.	p.c.
Defects of road.....	0	3	0	3	3
Defects of equipment.....	8	16	3	27	27
Negligence in operating.....	17	6	1	24	24
Unforeseen obstructions.....	0	9	0	9	9
Unexplained.....	15	21	0	36	37
Total.....	40	55	4	99	100

The number of trains involved is as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Passenger.....	13	6	1	20
Freight and other.....	56	50	3	109
Total.....	69	56	4	129

The casualties may be divided as follows:

	Colli- sions.	Derail- ments.	Other accid's.	Total.
Killed.....	13	6	1	20
Employees.....	8	13	1	22
Passengers.....	0	2	0	2
Others.....	11	0	0	11
Total.....	19	15	1	35
Injured.....	13	6	1	20
Employees.....	30	16	5	51
Passengers.....	6	10	1	17
Others.....	5	9	0	14
Total.....	42	35	6	83

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	0	3	2	4
Defects of equipment.....	0	0	2	13
Negligence in operating.....	0	10	9	51
Unforeseen obstructions and maliciousness.....	2	0	9	3
Unexplained.....	0	4	0	0
Total.....	2	17	22	51

Seventeen accidents caused the death of one or more persons each, and 23 caused injury but not death, leaving 60 which caused no personal injury deemed worthy of record.

The comparison with June of the previous five years shows:

	1895.	1894.	1893.	1892.	1891.	1890.
Collisions.....	40	39	72	75	50	64
Derailments.....	55	67	96	88	109	67
Other accidents.....	4	4	5	2	8	6
Total accidents.....	99	110	173	165	167	137
Employees killed.....	22	22	25	44	50	41
Others killed.....	13	14	15	26	10	17
Employees injured.....	51	71	114	143	130	98
Others injured.....	32	20	95	156	107	155
Passenger trains involved.....	20	35	55	77	53	65

Average per day:

Accidents.....	3.30	3.68	5.77	5.50	5.57	4.57
Killed.....	1.17	1.29	1.33	2.33	2.0	1.93
Injured.....	2.77	3.13	6.67	9.97	7.90	8.43

Average per accident:

Killed.....	0.333	0.327	0.231	0.421	0.359	0.423
Injured.....	0.839	0.851	1.156	1.812	1.419	1.847

Only 20 passenger trains were involved in train accidents in the month of June, so far as we have been able to learn. We find no other month in the last five years in which the number recorded was so small, and only two months when there were less than 35. The two passengers killed in June were not on a passenger train.

Among the worst accidents of the month were the three which appear first in our list. The collision at Rye was discussed in the *Railroad Gazette* of June 14, page 377. That at Greenville, Pa., was from a very common cause, but resulted disastrously, and the same is doubtless true of the third collision. The derailment at New Haven, Conn., on the 16th, reported as due to failure of air-brakes, is not yet fully explained, the official investigation being still unfinished. It seems likely an angle cock was closed between the tender and the baggage car, though a regular stop had been made only 13 miles back, when the brakes released promptly. No one thought to apply the brake by a conductor's valve, although the whistle signal for brakes was given more than once. The angle cock handles of the cars on the New Haven road have chains attached to them, to facilitate operations by men standing on the car platform; it is possible that one of these chains was struck and pulled by some accidental means.

The derailment at Fullen, Tenn., on the 29th, is said to have been the third accident of the kind happening near there within less than a year, and in each case the engineer was killed. A fast passenger train was derailed on Oct. 8, 1894, and the other derailment was on April 12 of the present year.

Of accidents on electric street railroads in June we find no less than 13, in which two persons were killed, two fatally injured and over 70 injured. Electric cars jumped the track at Pottsville on the 1st, Syracuse on the 2d, Pittsburgh on the 4th and Long Island City on the 18th. In all these cases the cars fell down a bank, and, in the last named, although the passengers were not badly injured, a dozen of them fell into a deep pool of filthy water. Near New Bedford, on the 23d, there was a derailment due to a broken wheel. Collisions occurred at Philadelphia on the 8th, Orange Lake, N. Y., on the 21st and Yonkers on the 24th. There were five cases in which electric street cars were struck by freight trains; at Streator, Ill.; Denver, Col.; Rankin, Pa.; Chicago, Ill.; and Sharpsburg, Pa. In the first two cases the freight trains backed against a street car. In the last-mentioned case the trolley came off the wire just as the car reached

the railroad crossing and the conductor was prevented by the darkness from replacing it in season to get his car out of the way of the freight train.

The trunk lines and the railroads of the Central Traffic Association, most of them represented by the President or one of the highest officers, held a meeting at Manhattan Beach, N. Y., on Tuesday and Wednesday of this week, and discussed a proposition to more closely unite the Trunk Line and the Central Traffic Associations. There seems to be a general and determined disposition to establish a more effective agreement between the roads, though there is nothing novel in the details of the plan as reported, and as far as the doings of the meeting have been made public, nothing decisive has yet been accomplished. The plan before the meeting is outlined by the daily papers as follows:

First.—The organization of a Governing Board with absolute powers, to which the rail and lake lines shall be parties, with representation.

Second.—The appointment of three commissioners to represent and possess its authority, issue its orders, construe agreements, authorize changes in rates, fares, etc.

Third.—The discontinuance of joint relations with lines which do not observe agreed rates or fares.

Fourth.—That if the present associations cannot be made more efficient they be merged.

Fifth.—That freight and passenger agencies be consolidated into joint agencies, under the direction of the commissioners, and that soliciting agents be discontinued.

Sixth.—That a clearing house be established, to clear all joint waybills, tickets, vouchers, accounts, changes of destinations, etc., and import and export freights, and all accounts heretofore audited or paid by fast freight lines.

Seventh.—That fast freight lines be discontinued, except as titles on cars and waybills and to indicate routes.

Eighth.—That conference in all cases precede action of a disturbing character.

Ninth.—That a uniform rule of majorities be made for all committees, such committees to be hereafter recommendatory in character to the Governing Board.

The July issue of the *Street Railway Journal* contains a table giving certain statistics of the street railroads of the United States. It sums up in the whole country 976 street railroads. The miles of track operated by electricity amount to 10,363; by horses, 1,914; by cable, 632; miscellaneous, 769; total track, 13,588. It will be noticed that this is miles of track, not miles of road. One of the peculiarities in street railroad statistics is that one can never tell the miles of road. One mile of road with double track appears in these statistics as two miles, and we have no means whatever of even guessing at the miles of street railroad. A most striking fact in the figures just given is that there remain but about 2,700 miles of track to be converted to the use of electricity and that 76 per cent. of the total mileage is now operated by electric motive power. We venture to say that few people appreciate this astonishing fact. The total number of cars with which these railroads are equipped is now 44,745, being 3.29 cars per mile of track. The Eastern States have the heaviest car equipment, being 3.9 cars per mile; the Central States come next, 3.74; and after that the New England States, 3.54. The total of capital liabilities, stock and bonds amount to \$1,300,139,711 or \$95,600 per mile of track, not per mile of road. The magnitude of this industry is astonishing to one who has never paid particular attention to these statistics. The last issue of Poor's "Manual" gave the total liabilities of the steam railroads of the country as \$1,441 million dollars for 175,442 miles of road. The street railroads it will be seen have over one-ninth as much capital invested as all the steam railroads of the country. Of course the investment per mile of street railroad is immensely greater.

One result of the recent International Railroad Congress, which was, of course, anticipated and predicted, will be the much more prominent place taken in the Congress hereafter by the English-speaking people and especially the increased interest in the United States. As we have before announced, the proceedings will hereafter be published in English as well as French and thus will become available to an immensely greater number of readers. Furthermore, England and the United States are hereafter to be more largely represented on the permanent committee of the Congress. The American representatives chosen are Frank Thomson, Vice-President of the Pennsylvania; C. P. Clark, President of the New York, New Haven & Hartford; C. M. Depew, President, New York Central & Hudson River; T. N. Ely, Chief of Motive Power, Pennsylvania Railroad; James de Roosevelt, Secretary of the American Embassy in London. The English representatives on the committee are Sir Courtenay Boyle, K. C. B., Secretary of the Board of Trade; Viscount Emlyn, Chairman of the Great Western; C. J. Armytage, Chairman of the Lancashire & Yorkshire; Gustav Behrens, Director of the Midland; Sir Henry Oakley, General Manager of the Great Northern; Frederick Harrison, General Manager of the London & North Western. The next general meeting of the Congress will be held in Paris in 1900.

NEW PUBLICATIONS.

Block Signals on the New York Central.—This is a little pamphlet issued by the passenger department of the New York Central, containing a careful and discriminating account, written by Mr. J. P. O'Donnell, the well-known English signal engineer, of the block

signaling on this road. Strictly speaking, this comes under the head of "Trade Catalogues," but as Mr. O'Donnell's intelligent work, including a good deal of accurate English history, makes a monograph of more than passing interest, we will take General Passenger Agent Daniels's view of the book and call it a "publication." It is No. 17 of his "four-track series" and costs six cents. It is not only the most novel publication that he has issued, but is also one of the handsomest, having a red and silver cover. The signals are illustrated by colored pictures and the artist has even taken pains to show us a train at night with the three regulation red tail lights, as used on the four track divisions of the Central. This picture perpetuates the ancient fiction of a four-track road in the Highlands of the Hudson. As the readers of the *Railroad Gazette* have before learned, the Hudson Division of the New York Central is the best signaled road, of its length, in the country, and, perhaps, in the world, and it is scarcely necessary to say that Mr. O'Donnell has made full use of this fact, and a little more. The book contains a portrait of Mr. W. R. Sykes, the originator of the lock and block system. His first patent was taken out in 1874. Mr. Sykes' instruments are in use throughout the whole length of the London, Chatham & Dover.

Traité Pratique de la Construction des Machines à Vapeur, Fixes et Marines.* By Maurice Demoulin, Engineer. Paris: Baudry and Company, 1895.

There is a demand for a good work on the steam engine, for the use of designers, steam users, and students in technical schools. While this literature is extensive, the rapid growth and improvement in the art have been such as to make it extremely difficult for an author to properly cover the subject. Most authors are too ambitious, and make an effort to treat the whole under one cover, with the result that the matter is a mixture of ancient history and modern practice, neither of which can be complete owing to the limited space at hand. Again, others limit themselves to modern practice alone, but include engine, boiler and general arrangement to the detriment of one or more of these parts.

This work of Demoulin treats of the actual knowledge acquired by the use of the steam engine, relations of the various types in use, the proper proportions to adopt, the determination of the dimensions of the principal parts, and the methods of designing these parts.

The book is printed as the French do those things, in clear type on excellent paper, and contains 430 pages. The text is well illustrated with scale drawings, showing details of parts, which will be a great help to designers and students. The paragraphs are numbered and headed in large type, with the subject matter of each, which facilitates reference in searching for special information—a plan which could be oftener adopted to advantage by publishers of similar works. There is no index, but instead there is at the end a table of chapters, the contents of each being more or less completely described. Reference can be made by searching for the chapter, and then consulting the headings of the paragraphs. Of course all dimensions are given in the metric system, which is a little confusing at first to one accustomed to using the British units.

In his preface the author states that the subject will only be treated according to the practice of the last few years, and that he will not undertake the discussion of theories with which the reader is supposed to be familiar or to trace the historical growth of the engine, which can be found elsewhere. The author's style is clear and, as far as the book goes, the subject is well described.

With the evident intention of making the work a practical book on the steam engine, it is divided into four parts. The first treats briefly of the general knowledge of steam engineering and the perfection attained, as viewed from a theoretical standpoint. Mr. Demoulin passes with slight mention the theories and hypotheses of little value and gives prominence to the chief thermodynamic facts, describing them in popular language without the aid of higher mathematics or calculus.

The second part treats of the selection of the type of engine to be adopted under given conditions. Owing to the extremely varied conditions found in practice, this question is not over fully treated, the author merely pointing out the advantages of certain types over others, and the advantages or disadvantages of economy in localities of cheap or high-priced fuel, and the cost of maintenance, repair and interest as affecting the balance sheet.

The third part treats of the principal parts of the engine as affecting the sizes and volumes of cylinders, and the mean effective pressures in simple and compound forms.

The fourth part treats of the methods of constructing the chief parts of the engine and the details of connection, furnishing some rules for the practical proportioning of the same. The book does not enter so much into the discussion of the methods of producing high economy as into the methods employed by builders and designers.

The opinions of other writers, French, English, German and American, are quoted to substantiate the author, but the happiest selection has not always been made. In the use of the steam jacket for instance, while examples are given and numerous extracts from other works made, only such selections have been given as are in its favor. Thus, the author states that in modern

* Practical Treatise on Marine and Stationary Steam Engine Construction.

practice the jacket appears to be an indispensable accompaniment to single cylinder engines, but does not make mention of any of the reliable tests which have shown little or no economy from its use.

Although limiting himself to modern practice, the author does not direct attention to the very latest practice in regard to cylinder ratios. He gives a table of maximum and minimum ratios, but these have been greatly exceeded, and the engines carefully tested for economy, although no mention of the fact is made by the author.

The methods for determining the mean effective pressures in compound engines, as given, are not as simple as some others; nor does the discussion fully set forth the losses due to drop in pressures between the cylinders.

The work can be commended as a whole, and when used by one well posted on the theory of steam generation, should be favorably received, especially when used in connection with a good book on machine design.

The chapters divide the subject as follows: The actual condition of knowledge relating to the steam engine; considerations relating to the type of engine to adopt with a given service; determination of the general dimensions of the engine for a given power; the cylinder: the frame; pistons and piston rods; cross-heads and guides; connecting rods; shafts and journals; bearings and brasses; fly-wheel; valves and dash pots, condensers and air pumps; packing and stuffing boxes.

Rhodes' Journal of Banking and the Bankers' Magazine.—Not many months ago we announced a change in ownership of the *Bankers' Magazine*, and described the change in form and scope which had taken place in that respectable journal. Beginning with the issue of July, the *Bankers' Magazine* is consolidated with *Rhodes' Journal of Banking*, published by Bradford Rhodes & Co., 78 William street, New York. It is believed that the consolidation will be for the interest of the subscribers and readers in that it will increase the capacity of the consolidated publication. The main departments of the magazine are editorial comments and leading articles, banking law, banking and financial news, money, trade and investments. The latter department gives a pretty complete review from month to month of the main features of the financial situation, giving money rates in New York city and in foreign markets, conditions of banks at the close of each week, bank clearings in the United States and Canada, brief and important statistics concerning foreign banking, and other important financial intelligence. Tables of prices of stocks and bonds are also given.

A Short Description of the Boston Water-Works. By Desmond Fitzgerald, Resident Engineer Additional Supply Works and Superintendent Western Division. Published under the authority of the Boston Water Board. Boston. 1895.

Mr. Fitzgerald has prepared a little volume of only 44 pages, with many interesting pictures from photographs and a good map of the watersheds of the Sudbury and Cochituate supplies. The writer simply undertakes to describe as briefly as practicable the existing water-works system and does not touch the great metropolitan system. He treats the subject under the following heads: Source of Supply, Storage Reservoirs, Sanitary Considerations, Low Service Distributing Reservoirs, High Service, Distribution and Consumption, with summaries of cost and other statistics. The book will be of especial interest to those engineers who had an opportunity to learn something of the present and proposed water-works and to see something of Boston municipal engineering at the recent convention.

Transactions of the American Institute of Electrical Engineers. Vol. IX., for the year 1894. Published by the Institute, 26 Cortlandt street, New York City. Ralph W. Pope, Secretary.

This volume of 938 octavo pages contains the papers, committee reports and discussions of the Institute for the year. It also gives a list of members. It has an index to authors and to those who took part in discussions, also an index of papers and topics. It happens that this volume has not so much that is of especial interest to railroad engineers as some former volumes, yet it is a very important collection of electrical literature.

TRADE CATALOGUES.

Modern Methods of Fuel Handling in Locomotive Coal-ing Stations, etc. The Link Belt Engineering Co., Nicetown, Philadelphia, and 49 Dey street, New York.

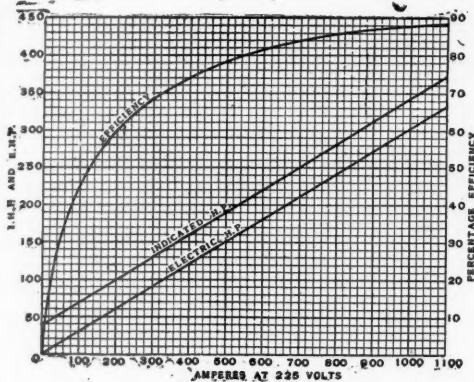
The Link Belt Engineering Co. sends us a pamphlet made up entirely of blue-prints, showing arrangements for handling coal in various plants. These include coaling stations and ash conveyors on railroads, some of them of very large capacity. Also ash handling plants and coal conveyors in various large works, including the Philadelphia Traction Co., and Electric Traction Co., of Philadelphia; the Metropolitan Traction Co., of New York, and other important examples.

Rubber Belting.—We have received illustrated catalogues and price-lists from the New York Belting & Packing Co., 13 and 15 Park Row, and the Peerless Rubber Manufacturing Co., 16 Warren street, New York. We shall not commit ourselves as to the relative merits of these two catalogues, which are both good. They are in convenient octavo form and have good indexes, and are well illustrated and give price-lists and considerable informa-

tion. As our readers know very well, these companies manufacture a great variety of rubber goods, hose, belting and packing, which articles are of especial interest to railroad men, being, however, only a part of their various products.

The Central Valve Engine. Third edition. The M. C. Bullock Manufacturing Co., 1170 Lake street, Chicago, 1895.

The central valve engine has proved very successful in England, where it is manufactured by Willans & Robinson, Ltd., of Thames-Ditton, and efforts have been made, with some success, to introduce it into America. A number of the engines are in use in this country, and, by economy of steam and other advantages, have given satisfaction.



The central valve engine is so-called because its valves are placed within the hollow piston rod, and are moved in it, over ports in its circumference, by an eccentric on the crank pin. The engine runs at high speed, has a small fly wheel, is vertical, thus occupying small floor space, and is especially adapted to direct coupling, for electric work. The parts are all interchangeable, so that repairs may be quickly made, and the simplicity of the construction also conduces to this.

The catalogue contains many interesting illustrations of the application of the engine to electric work, and will be useful to those designing electric plants. Perhaps the most striking illustration is the efficiency diagram, derived by Professor A. B. W. Kennedy from a test in connection with a shunt-wound series dynamo. The diagram is given here.

Truths. The Hogan Boiler Co., Middletown, N. Y., 1895.

The makers of the Hogan water tube boiler have issued a pamphlet under the above name, setting forth its merits. Tables and illustrations form a part of the catalogue.

A Basis for Freight Rates.

(CONTINUED FROM PAGE 497.)

warehouse, especially if operating on a close margin, where he can have railroad competition, that then possibly he can dictate to the railroads and can at least secure the same rates his competitors do. The result of this feeling accounts for what Mr. Fletcher calls "the doom of the small town," which he proves by statistics has already taken place.* The falling off of local freight business is the greatest disaster that can happen to a railroad. The fight of the Chicago shippers (which attracted so much attention this winter) for lower rates, not on the ground that the rates were too high, but that Detroit shippers were getting better rates in territory, which Chicago claimed shows the feeling that is always uppermost in the minds of shippers. The ordinary objections to the system of "charging what the traffic will bear" are apparent and have been clearly taught by Mr. Hadley. The growth of commercial injustice is so rapid and so injurious that repeatedly in response to the demands of the people states have sent out committees to investigate complaints made against railroad corporations. The number of these committees is legion, the testimony collected voluminous. The committee of the United States Senate reported:† "It is substantially agreed by all parties in interest that the great desideratum is to secure equality so far as practicable, in the facilities for transportation offered, and the rates charged by the instrumentalities of commerce."

The American people have had marvelous patience with the workings of the well-known "Act to Regulate Commerce," founded on this report. We were frequently told the "long and short haul clause," to prevent discrimination between localities, could never be carried into effect, but here the Commission has been successful and in so doing has built up discrimination between other localities, by discrimination on parallel lines of "valleys of low rates and highlands of high rates."‡ There are 94 all-rail routes competing for freight between New Orleans and New York.§ Imagine how the short haul clause affects the intervening territory. As for preventing pooling, since the railroads are barred by law from the better methods of pooling, it has forced them to pool in inconvenient and unsatisfactory ways

* "The Doom of the Small Town," by H. J. Fletcher, *The Forum*, April, 1895.

† From "Report of the Committee of the Senate Upon Interstate Commerce," January, 1886.

‡ "The Railway Problem," by A. B. Stickney, Chap. XVI. § "Can Railroad Rates be Cheapened?" by H. T. Newcomb, *The Forum*, October, 1891.

annoying to the roads and of no benefit to the public. The Vice-Chairman of the Trunk Line Traffic Association has made the statement that rates are in a worse condition than they were before the Interstate Commerce Act was passed. However, the science of railroading has advanced since 1885, and the Interstate Commission has accomplished much of inestimable value, although it has not fulfilled the main purpose of its being. Its powerlessness has long been evident. It is being tossed about by the railroads like a young mahout on the trunk of an elephant.

Never was there a more uncertain system of taxation levied on a more changing basis than that which the railroads collect from the American people. Every necessity and luxury has at some time, or in some form, paid its quota of this tax. Though railroads are private enterprises, they are levying taxes restrained only by the laws of competition. The fundamental law of taxation is shown in the classic comment of Adam Smith:

"The tax ought to be certain, not arbitrary. The certainty of what each individual ought to pay is, in taxation, a matter of so great importance that a considerable degree of inequality is not so great an evil as a very small degree of uncertainty."

The law of competition, Toynbee, the master economist, shows:

"Competition resembles a great physical force which cannot be destroyed, but may be controlled and modified. We think it neither good nor evil, but seek to analyze it and ascertain when it produces good and when it produces bad results."

And the recent chairman of the Interstate Commerce Commission has shown us that with railroads unrestricted, competition is essentially self-destructive.

A Remedy.—The best interests of the railroads and the shippers demand a basis for rates that is elastic, and that can be adjusted to conform to the conditions of the crops and the markets, that is, meet the conditions made by the laws of supply and demand, and withal be more stable than those in use. Having defined the law and basis for freight rates and having shown their present predicament, the second object of this article is to advocate a measure that will remedy and, I believe largely remove the existing evils, that is, the establishing of postal-package-freight.

It should apply on shipments when put into standard packages say 200 lbs. (the maximum that one man can handle economically). It should be under government supervision, not government control. In order that it may not make too great a variation on the rates now in effect, the factor, *distance*, should be maintained by using the Hungarian system. And, since one uniform classification for the entire country is impracticable, so too is one basis for freight rates. We should have, for example, one basis for the official classification territory, one for the Western, etc., at least as many as we have classifications and each basis governing, or a monopoly, in its territory, i. e., the Hungarian circles should be larger in some territories than in others as the case may require.

It will establish a maximum rate for shippers, who will put their goods into standard packages, and maintain the rates once agreed upon by the railroads and commissioners as reasonable rates for package freight. It will control true competition which is especially lax on this class of freight. It will furnish a basis for rates more just than that made by the "long and short haul" clause. It will leave the railroads free to make their charges on shipments of larger consignments as near this standard as the traffic will bear and competition allow. It will tend to advance consolidation of roads where it is needed. It will give the Interstate Commission something tangible with which to accomplish rational ends. It will lessen the need for an army of freight solicitors, the liches of railroads. It can be accomplished without any additional outlay of capital. It will not interfere with express business for if the shipper wants to pay extra for despatch and insured safety he would have the privilege then as now. The objection that the effect of such an average rate on quantities in less than car loads will increase the high class shipments and decrease those of low class is true only in the first part, and since lower class shipments invariably go in larger quantities it will only tend to increase their size. Increased economy for railroads means lower rates for shippers, and the uniformity of packages will make it possible to stow goods to avoid damage by breakage and lessen the cost of hauling. Railroads will be able to lower rates when a great staple commodity is to be moved and managers know that other rates will not be changed, for cut rates are contagious, and experience shows that the moment a strong line cuts on a staple commodity the weak lines cut wherever they will not be caught. It will tend to stop the building of parallel lines and increase the building of feeders for the present lines. The wonderful growth of electric roads, many of which are carrying package freight, is important. Every influence should be used to make them into freight feeders, not competitors on parallel lines.

To give a description of our United States mail system, or the Western Union telegraph system, or the English postal-package-freight system, would be a book in itself. It is a strong argument that England has such a system; and that it has proved itself beneficial and sat-

* "Wealth of Nations," book v., ch. ii.; also "Principles of Political Economy," by J. S. Mill, book v., chap. ii.

† Lectures on the Industrial Revolution in England, by Arnold Toynbee (page 20).

‡ See "The Thirty-first Report of the Postmaster General on the Post Office," page 3. Parliamentary Reports for 1885. Also statistical table showing growth of business given in "The Thirty-seventh Report" of same for 1891.

isfactory; in this respect England is ahead of the United States. No system will be accepted until it is shown to be more profitable for both railroads and the public. That a system could be devised that would be harmful is true. That one could be devised that will be of benefit is equally true. To outline the workings of a postal-package-freight system will require the best ability of our most able and experienced managers aided by the editors of our railroad papers and magazines, who have already accomplished much by placing matters in their true light. On the one hand, there is a strong element advocating government control, among these, curiously enough are some of our most distinguished railroad presidents and general managers; on the other hand there is a strong element advocating consolidation into monopoly, and among the well-known men that have advocated this policy are Mr. C. P. Huntington and Mr. H. H. Porter; they base their arguments on the success of the Western Union Telegraph Company. An old and familiar saying of Mr. Charles Francis Adams affects both sides: "if the government does not own the railroads the railroads may own the government."

Transportation is a controlling factor giving shape to every man's private business and the policy of every nation. Our nation maintains that all men are equal and the "industrial revolution," as it is sometimes called, is to maintain equal industrial rights.

"We belong to a sturdy race, descendants from a long line of sturdy ancestors who have dared to defend their rights. These rights, among which is that to own individual property and to receive its proper income, must not be ignored. . . . By the people who suffer from discriminations, they are regarded as the wanton acts of railway officials; by the railroad managers they are regarded as unavoidable, under the present circumstances."

The present political aspects, particularly in the West, point toward the fact that some action is inevitable. This should be guided to work for the "best good of all." Since the establishment of postal-package-freight will accomplish what no commission has, and will leave free all the means whereby we have gained our superiority; the sooner it is established the better.

The Heating Value of Coals.

We give below the results (from the *Sibley Journal of Engineering*) of some experiments recently made at Cornell University with a coal calorimeter devised by Prof. R. C. Carpenter. It consists of two cylindrical chambers, in the inner one of which the sample of coal is burned in oxygen. The heated gases pass through a coiled copper tube about 10 ft. long contained in the outer chamber. The coil is surrounded by water which expands, the expansion being measured in a finely graduated glass tube, thus giving the heat units in the coal. The calorimeter is calibrated by burning in it pure carbon. Following are the tables:

ANTHRACITE COAL—AVERAGE TABLE OF RESULTS.

Mine.	Locality.	Moisture	Volatile matter.	Ash.	Fixed carbon.	Sp. grav.	Per cent. slate.	B. T. U. In 1 lb. combustible matter.
L. V. Buckwheat.	W. Barre, Pa.	1.34	6.42	15.3	76.94	1.3	9.75	11,801
Jermyn.	Schuyl. Co. Pa.	1.7	5.78	10.84	71.68	1.425	9.80	12,036
Woodward.	Scranton, Pa.	3.33	3.73	13.71	79.23	1.42	2.51	12,149
Cayuga.	Scranton, Pa.	.97	5.37	9.2	84.46	1.49	6.2	12,291
Mr. Pleasant.	Scranton, Pa.	1.27	7.54	10.65	80.54	1.42	0.162	12,307
L. V. Pea.	L. V. Region.	1.44	7.36	16.00	75.2	1.32	8.21	12,423
Forty Foot.	Scranton, Pa.	1.12	4.39	9.91	83.98	1.415	3.54	12,903
Manville Shaft.	Scranton, Pa.	1.4	5.95	7.31	83.7	1.42	0.589	12,934
Continental.	Scranton, Pa.	1.27	5.98	9.62	83.13	1.615	5.48	12,943
Avondale.	Avondale, Pa.	1.28	5.89	6.15	86.98	1.44	0.228	13,051
Oxford.	Scranton, Pa.	1.35	5.03	2.17	91.45	1.415	0.11	13,254
M. moth.	Dighton, Pa.	2.97	2.3	6.77	87.96	1.55	0.00	13,324
Buck Mountain.	Cross Creek, Pa.	3.62	1.96	5.23	89.19	1.56	0.63	13,723

BITUMINOUS COAL—AVERAGE TABLE OF RESULTS.

Mine.	Locality.	Moisture	Volatile matter.	Ash.	Fixed carbon.	Sp. G.	Average B. T. U.	Pounds combustible matter in smoke from 1 ton coal.	B. T. U. In 1 lb. combustible matter.
Gillespie.	Gillespie, Ill.	3.77	34.94	11.74	49.55	1.23	10,506	11.8	13,700
Burnt Co'l Wks.	Monongahela River, Pa.	2.27	31.29	7.83	58.61	1.275	13,126	20.91	12,043
Astrim.	Ci'field Co., Pa.	1.23	18.51	10.9	69.3	1.42	13,528	5.29	12,724
Eureka.	Ci'field Co., Pa.	1.03	24.55	5.73	69.69	1.32	13,756	8.63	10,899
Turtle Creek.	Monongahela River, Pa.	2.11	34.22	4.22	59.45	1.28	14,150	6.12	11,827
Nova Scotia.	No. 2 Slope, Nova Scotia.	3.08	31.41	3.80	61.71	1.31	14,864	5.33	11,231
Rey'd'sville.	R'd'sville, Pa.	1.09	21.4	5.3	69.21	1.34	14,971	6.53	12,217
Leisenring.	Connellsville.	1.93	28.71	6.1	63.26	1.34	15,005	18.25	12,855
Pocahontas.	New River, Va.	1.25	17.62	3.65	77.48	1.255	15,094	4.09	15,255
Cooperstown.	Nova Scotia.	1.11	30.42	4.03	64.44	1.345	15,266	9.88	11,939

TECHNICAL.

Manufacturing and Business.

The King Car Co., of Scranton, Pa., was chartered last week to build railroad cars, trucks and parts of cars. The capital stock is \$100,000, and the Directors: S. D. King, President; Geo. B. Smith, Chas. S. Farrer, of Dunmore; Clarence D. Simpson, Thos. H. Watkins, of Scranton, Pa.

The Mt. Carmel Iron Works, Mt. Carmel, Pa., has been chartered with a capital of \$20,000, and these directors: David Coup, Thomas H. Williams, Thomas Gillespie, Holden Chester, James M. Derby, Isaac A. Kline, James W. Perry, George S. Sterling.

The Champion Steam Joint Reamer and Grinder Co.,

* "The Railway Problem," by A. B. Stickney, Chap. I., p. 5.

75 East Strand, Rondout, N. Y., has been formed for the purpose of manufacturing the steam joint reamer and grinder illustrated in our issue of June 14 last. Since that time several improvements have been made in details of the machine. Before this device was used on the Ulster & Delaware two men worked eight days to grind the joints in one locomotive; after being put in use the one machine ground the joints in three locomotives in less than four days, only one man being employed to operate it. J. H. Jones is manager of the company and W. S. Turck, Jr., Treasurer. Mr. Frederic Brandes, the inventor, will have charge of the manufacture of the machines.

The Missouri Construction Co. has been incorporated in St. Louis to construct railroads, bridges, etc. The capital of the company is \$100,000, and the stockholders are O. W. Hester, A. O. Cooper, L. W. Harper, C. A. Cunningham and Scuder Hinde.

The Union Brick Works of Tacoma, Wash., recently secured the contract for furnishing the Northern Pacific Railroad with 2,200,000 bricks to be used in arching the great Stampede tunnel in the Cascades.

One of the largest dredges ever built in the United States is now being completed at the ship yards of Hay & Wright, of Alameda, Cal. It will be used in building levees on the San Joaquin River.

The Rome Iron Company, of Rome, Ga., which operates two furnaces and has kept both in blast during the depression in business, has raised the wages of its employees 10 per cent.

Iron and Steel.

The capital stock of the Newcastle (Pa.) Tube Co. has been increased from \$100,000 to \$150,000. The new plant is expected to be in operation by Sept. 1.

The Pennsylvania Bolt & Nut Company, of Lebanon, has all departments on full time. This company now has its own foundry well equipped.

The Colorado Fuel & Iron Co. has sold \$2,000,000 of its bonds in New York City. The proceeds will enable the company to pay off its bond loans, preferred stock scrip and other floating debt, and give an increased working capital of between \$400,000 and \$500,000, thus placing the company in strong financial condition. It will at once enlarge its force at the mills in Pueblo and also open some of the mines which are now closed.

Citico Furnace at Chattanooga has been relined, and will resume operations this week. The Tennessee Coal, Iron & Railway Company is overhauling and placing in first-class condition its furnaces at South Pittsburg, Tenn.

Pittsburg companies have secured all of the contracts for the new plate mill of the Bethlehem Iron Company. The Mackintosh-Hemphill Company will erect and place the machinery of the mill, and the Tretheway Mfg. Co. has secured the order for shear knives.

The New York Life Insurance Co. has sold the Moorehead-McCleane iron plant at Pittsburgh to a syndicate

W. B. Scaife & Sons, Pittsburgh, are erecting several large steel frame buildings for the Canonsburg Iron and Steel Company.

The new machine shop of the Carnegie Steel Company at Homestead was put in operation Monday. One hundred and fifty men are employed. An addition will be built to the 32-inch beam mill.

The Kittanning (Pa.) iron mill, which has been idle for two years, started up on Monday, employing 200 men. One order for muck bar insures five months' operation.

The Sheffield Iron and Steel Co. has purchased the entire plant of the Alabama Iron & Steel Co., at Montgomery, including three furnaces at Sheffield and several thousand acres of mineral land. Two of the furnaces will be started up at once, and it is said that a steel plant will be built at Sheffield.

New Stations and Shops.

A joint freight transfer house will be built by the Pennsylvania and the Columbus, Hocking Valley & Toledo, in East Toledo, at the upper end of the companies' yards. It will be a frame structure 200 ft. long by 30 ft. wide and will cost about \$8,000.

The Toledo, Ann Arbor & North Michigan has had plans prepared by Mr. E. O. Fallis for a new passenger station to be erected at Cherry street, Toledo. The building will be 50 x 100 ft. and two stories high. A portion of it will be higher to make room for the general offices of the company. A new engine house is to be built at Manhattan Junction.

The Foundations of the Johnston Building.

The foundations now being put down for the Johnston Building at the corner of Broad street and Exchange place, New York, are very interesting examples of engineering construction. Borings showed the soil to be loose, wet earth and fine sand. The foundations rest on caissons, which are open steel cylinders sunk by the use of water jets issuing from hollow castings bolted to their lower edges. The cylinders are about 27 ft. long and from 6 to 13 ft. in diameter, according to the load. The rapidity with which they are sunk is remarkable. The contract called for the sinking of 40 caissons in 50 days, and the work will be completed considerably inside of the contract time. The cylinders are heavily weighted with pig iron and when the water jets are started they sink with an average speed of one inch a minute, although in some cases this reached as high as a foot a minute. The caissons are sunk to rock 40 ft. or more below the sidewalk in from two to ten hours each. When sunk the interior of each one is excavated and a concrete bottom put in, after which the remainder is filled with brick masonry to the level of the grillage supporting the column. The loads on the caissons vary from 342 to 1,044 tons per column, and the cylinders are proportioned to give a pressure of about 12½ tons per square foot on the brickwork and 15 tons per square foot on the rock. The process in question is a new one and it has not previously been used for this purpose. It is the invention of Mr. William D. H. Washington, the General Manager of the Hydraulic Construction Co., which is doing the foundation work for the building. The opinions of Messrs. John Bogart, R. L. Harris, G. W. McNulty and H. W. Brinckerhoff were favorable to the trial of the proposed plan, which was submitted to them before being adopted. Mr. Brinckerhoff is at present Consulting and Supervising Engineer of the work, being retained in that capacity by the Hydraulic Construction Co.

Collapse of a Large Wharf Shed.

The steel framework of the large wharf shed which the Shiffler Bridge Co., of Pittsburgh, Pa., has been building for the Fall River Line at Pier 19, North River, New York, collapsed during a thunder storm on the night of Saturday, July 20. The structure, which is 680 ft., long, was almost completed, the various posts and roof trusses being in place and a part of the riveting being done. The posts had been merely fastened down with lag screws since they had not yet been levelled up, but this in itself could not account for the accident. An inspection of the ruins showed that the entire structure had fallen shoreward, each truss with its posts falling down upon the preceding one. The wind was southwest at the time and was not particularly heavy. As far as could be seen from an inspection of the wrecked structure no longitudinal bracing whatever had been put in. The structure, therefore, had no rigidity, and, with nothing to prevent distortion, was easily blown down. It is possible that guy ropes attached to the posts may have shrunk after having become wet from the rain, and thus assisted the wind in its work. The report that the collapse was the result of a stroke of lightning has no foundation.

Car Heating.

The Safety Car Heating & Lighting Company's direct steam regulating system will be applied to 192 Illinois Central passenger coaches, most of which run in the suburban service out of Chicago. It is the expectation of the railroad company to have all of the cars equipped for use this fall. The temperature of the car can easily be regulated by means of a valve, which increases or reduces the amount of radiating surface as may be required.

Gould Coupler Works Burned.

That portion of the works of the Gould Coupler Company situated at Black Rock, Buffalo, N. Y., was burned last Monday. This is the Gould Steam Forge where the company manufactures links, pins, car axles and heavy

forgings. About 150 men are employed at those works. This does not in any way affect the principal works of the company.

The Boston Subway.

We said last week that the delay in the work on the Boston Subway has been relieved by the arrival of steel from the Pennsylvania Steel Co. We hope that that is true this week; it was not true, however, last week when we said it. The fact is that the work of the contractors is being greatly delayed at the very time when they should be pushing ahead at the maximum speed, because the steel is not delivered as stipulated. Work is going on now, but it is going slowly. Nothing is doing, however, in the way of erecting steel. We are informed that it is not likely that the Commissioners will be ready to ask for bids for other sections of the work for a number of weeks yet.

The Nicaragua Canal Commission.

We announced last week the arrival of the Montgomery, bringing the Nicaragua Canal Commission, at Key West. Early this week the vessel arrived at New York. We have nothing to add to the former note other than to confirm the statement that the party has been singularly free from illness or bad luck of any sort. They were fortunate from an engineering point of view in seeing the country during the rainy season and being permitted to observe some of the effects of the tropical rains. Of course the Commissioners are saying nothing to indicate the nature of their report, and it is safe to say that any stories as to their opinions or the probable nature of their report are either fabrications pure and simple or breaches of confidence.

International Conference on Testing Materials.

We have received notice that a conference will be held at Zurich, Switzerland, on Sept. 9, 10 and 11 for the purpose of considering the adoption of standard methods of testing structural and other material. Besides the various excursions, banquets, etc., included in the programme, the professional work of the several sections will be presented and comprehensive reviews given of the results of investigation and experiment on the testing of materials; the behavior of cast iron at low temperatures, the phenomena of unreliability in ingot iron, the action of sea water on hydraulic cements, the selection of uniform methods for the analysis of iron and steel, the examination of lubricating oils, etc. A commission has been formed for determining uniform methods of testing structural materials. It is composed of 173 members, comprising engineers from Germany, Austria, Italy, Switzerland, France, Russia, Holland, Belgium, England, United States, Japan, Chili, Roumania, Sweden and Servia. G. C. Henning, of New York, H. M. Howe, of Boston, and W. W. MacKay, of Glen's Falls, N. Y., are the three American members. Communications intended for the conference should be addressed to Prof. L. V. Tetmajer, the President, Zurich, Switzerland. Special commissions will report upon 20 different subjects, including tests of the flexibility of metals, tests of corrosion of wire, the microscopic structure of metals, experiments on soldering, compression tests of iron, tests of iron and steel, railroad materials, axles, etc., determination of the quality and climatic resistance of roofing slates, tests of cement, building stones and hydraulic mortars, etc.

Dixon's Graphite Pipe-Joint Compound.

The Joseph Dixon Crucible Co., of Jersey City, has adopted the above name for the compound heretofore known as "pipe-joint grease." It is not a grease, and the company concludes that a more accurate name ought to be used. This compound, testified by many users to be far superior to red lead or anything else in use, has now been in the market about twenty years. A large user in Harrisburg, Pa., says that he has forbidden the use of white or red lead for steam, gas and water piping, flange joints, etc., and now has no trouble from broken bolts or nuts.

The Empire State Express Engines.

The record of these engines on the New York Central during the past year would show many points of interest. It is worth notice, for instance, that one of them hauling the Empire State express has been cut out but once during the year's service, and this was only because of a defective whistle. Mr. Buchanan, Superintendent of Motive Power, intends to keep some special records of the performance of these engines. He proposes to weigh all the moving parts of engines before they leave the shops, including the piston rods, cross heads, drivers, truck wheels, etc. When they go to the shop again these various parts will be again weighed and the loss in weight of metal accurately ascertained. By comparing this with the mileage made by the engine during the time of service some interesting figures will be obtained. To determine accurately the amount of coal used Mr. Buchanan proposes to weigh the engine and tender before coaling and afterward, the difference in the two weights thus showing the amount of coal taken on board. Up to this time the amount of coal used by these engines has not been ascertained.

Armor Plate for the Russian Government.

The armor plate supplied to the Russian Government by the Bethlehem Iron Works, and which has successfully passed the acceptance tests, is nickel steel, not treated by the Harvey process. The Russians fire at a plate a number of shells from a small-caliber gun, and the plate must not crack or show more than a limited penetration. On the whole their test is not as severe as our own.

The National Railway Foot Guard.

The National Railway Foot Guard Co., of Columbus, O., has received an order to put its guards in all the track angles of the large yards of the Cincinnati, New Orleans & Texas Pacific in Cincinnati.

Coal Unloaders at Lake Erie Ports.

Machines for transferring coal from cars to vessels more rapidly than can be done by any of the old processes are now receiving a great deal of attention at Lake Erie ports, and three new machines are soon to be put in operation at Cleveland. One of these is for the Erie Coal Transfer Co., and is on the New York, Pennsylvania & Ohio dock. This will probably be completed within a week or two. The loaded car is run into a large cylinder where it is securely fastened, and the cylinder is then rolled up an inclined plane, stopping in the right position to let the coal fall out of the car by gravity. The machine that is being built on the Cleveland & Pittsburgh dock consists of a cradle in which a loaded car is placed and then swung on a trunnion, tipping the car sufficiently to pour out its contents. The coal falls through six hoppers into six buckets, which are then conveyed to the hold of the vessel. A third machine, differing from the other two, is to be built on the Cuddy-Mullen dock. The machine emptying into six hoppers is made by the Brown Hoisting & Conveying Machine Co., and it is said that the company has orders to build similar machines at Toledo, Huron and Ashtabula. At the latter place there is one of the McMyler machines, which was built last year. All of these machines are for unloading cars which have no hoppers in their bottoms.

Pig Iron Production.

The total production of pig iron in the United States during the first half of 1894 was 2,717,983 tons, in the second half of 1894, 3,939,405 tons, and in the first half of 1895 4,087,558 tons. The gain this year over the second half of 1894 was 148,153 tons and over the first half of 1894, 1,369,575 tons. The total production for 1890, which was our maximum production, was 9,202,708; in 1892, 9,157,000; in 1893, 7,124,502, and in 1894 6,657,388. The production from June 30, 1894, to June 30, 1895, was 8,026,963. Statistics of unsold stock show 662,068 tons at the end of the last half of 1893. For the first half of 1894, 517,036 tons, for the second half of 1894, 597,688 tons, and for the first half of 1895, 489,290 tons. To the last figure should be added 81,300 tons, lying in the yards of the American Pig Iron Storage Warrant Co., not under the control of the makers. This raises the total on hand June 30, 1895, to 520,590 tons. These figures of unsold pig iron do not include that sold and not removed from the furnace bank nor that manufactured by the rolling mill proprietors for their own use. The statistics of unsold stock at the end of the first six months of this year are exceedingly favorable to the producers.

THE SCRAP HEAP.

Notes.

The Southern Pacific is to build a hospital at Oakland, Cal. It is to be paid for out of the hospital fund, which is sustained by the employees.

The customs officers at Detroit have arrested a sleeping car conductor and a porter, for smuggling Chinamen into the United States in sleeping cars from Canada.

Vice-President W. H. Baldwin, of the Southern Railway, has issued a circular directing all heads of departments to discharge or transfer all men in their departments related to themselves either by blood or marriage.

The Board of Health of Long Island City, N. Y., asked for an injunction last week against the Long Island Railroad, prohibiting the use of soft coal in switching locomotives, but Judge Gaynor refused to grant it, saying that the question must be fully tried on its merits before it will be right to order a radical change in practice.

The Philadelphia city government made a determined effort this week to enforce the penalty prescribed by ordinance against those street railroads which have failed to put fenders on their cars, but the magistrate decided in favor of the companies, holding that the ordinance was grossly defective. The first section is drawn in such a blundering way that the magistrate suggested that the ambiguity may have been intentional.

On Thursday of last week a special train of four cars was run from Pittsburgh to Cleveland over the Pittsburgh & Lake Erie and the New York, Pennsylvania & Ohio in 2 hours 44½ minutes, the distance being 135 miles. Engines had to be changed at Youngstown, and there were accidental delays of 6 minutes on account of a freight train and 8 minutes by a hot box; and from Newburg to Cleveland, six miles, the time consumed was 15 minutes. It is calculated that the speed while in motion south of Newburg was over 60 miles an hour. The inclusive speed, through, is 50 miles an hour.

Philadelphia Traction Companies Combined.

The plan to unite the Philadelphia, the People's and the Electric Traction Companies was completed this week. It provides for the amalgamation of the People's and Electric Companies, the consolidated concern then to lease the Philadelphia Traction Company at 4 per cent.

The new company will have a capital of \$30,000,000. The shares (\$50 each) will be held at the disposal of the different companies, as follows: Philadelphia, 310,000; People's, 155,000; Electric, 135,000.

John Lowber Welsh will be the president of the new company. Three directors are to be chosen from each of the different companies.

Burlington & Mt. Holly Electric Line.

The local passenger trains on this 7-mile line of the Pennsylvania Railroad in New Jersey are now run by electric motors, the first regular electric train having been run last Monday. The northern terminus of the electric line is at East Burlington, the company having found difficulty in securing a right of way for the construction of an additional track to the center of the town of Burlington. This change of the terminus of the runs of the trains has produced a good deal of unpleasantness in Burlington, the Mt. Holly trains having heretofore traveled over a portion of the main line to reach the principal station in the town. The company has reduced the fare over the Mt. Holly line, but this does not make up for the withdrawal of privileges, and the people are talking of various schemes to harass the road. Some wish to enforce an ordinance limiting the speed of trains to six miles an hour, while others hope to get a lot of money out of the railroad treasury by raking up an old law requiring an annual payment by the road to the town for the privilege of using the right of way.

By the new time table there will be ten trains each way on week day, instead of six as heretofore, and nine each way on Sundays. One of the ten trains is hauled by a steam locomotive, and runs through to Burlington as heretofore. The fare between Mount Holly and East Burlington and all intermediate points is ten cents. On Monday the number of passengers was three or four times as large as usual.

The electric generator is not yet completed, and a temporary machine had to be put in.

New Coal Vessels for the Reading.

The increasing coal shipments to New England ports and the difficulty at times of securing vessels to carry the coal, have determined the receivers of the Philadelphia & Reading to ask the United States Circuit Court for permission to contract for the construction of a large ocean tug, a harbor tug and six coal barges. The ocean tug will be about 167 ft. long, and the harbor tug 90 ft. The barges will have a capacity of 1,000 tons each. With these additions the Reading's fleet will consist of seven steam colliers, eight steam tugs, 102 barges, 31 sea-going barges and 11 car floats. It is probable that the new tugs will be built in Philadelphia and the barges in Connecticut.

The Collision—Circus Fake.

Newspapers in Ohio (which, we believe, was at one time called the Collision State) have published accounts for a week or two past that one A. L. Streeter was going to have "the most unique" exhibition ever heard of; it was nothing less than a full-speed butting collision of two old locomotives. He had engaged an enclosed piece of ground near Canton, had painted the engines white, lettered them "Protection" and "Free Trade" respectively, and, it appears, had actually engaged the engines; but not enough people came to the show; he could not pay for the engines and the gate money, said to be \$2,000, was refunded. The crowd was mad, and smashed the lamps in the cars of an excursion train.

Interlocutions—No. 4.

"To live a lie and yet be conscious that you are capable of better things, to be guilty of criminal acts still knowing and willing to do what is right; why twist my wheel!" said the Semaphore excitedly. "I would almost rather be a straight-out time signal with an alcohol brain than the thing I am. A whited sepulcher, a pit for the unwary. Bah!" he concluded with a shudder, "it makes me hate myself."

"What's the matter with the old dotard now?" wondered the Crank to himself, but added aloud, "I reckon that crack in your back light must have struck in."

"Hush!" said the Semaphore, "let me listen. This is no time for joking. The local wire rubs against my post and it's just spitting fire. The old man is wild, the General Superintendent is mad, and the operators at X Y and G K are trading compliments that would melt a glass insulator. I always said it was bound to happen. Ten cars and the engine of the through freight, the caboose and two other cars of the local are mashed into scrap iron and kindling wood, and little Jin my Phelan, conductor of the local, is a bloody corpse. Well, well! I didn't do it, and so I suppose I ought to give thanks and keep still, but it might have happened to me just as easily as it did to the other fellow, and I expect it will some day."

"When did it happen and what caused it?" asked the Crank with a more than common display of interest.

"It occurred at 9 o'clock this evening; it was caused by general damfoolishness, poker and the block signal rules, a conjunction of circumstances, a concatenation of errors, a coincidence of mistakes."

"Your fondness for epigram and long words tends rather to obscure than to—oh, for mercies' sake talk United States," implored the Crank.

"I will endeavor," said the Semaphore condescendingly, "to bring my language down to your level."

"The rules, you must know, require that a block signal shall be held at danger for 10 minutes after the passage of a train; if another train approaches, it may be sent on without stopping after the 10 minutes has elapsed, but under a permissive signal; of course, as soon as the first train gets out of the block the second train gets a clear signal, no matter whether the 'time limit' (the man who invented that idea will not get a clear signal when he dies) is up or not."

The local came up to X Y tower and got orders to take the siding at Monkey Run, and let two sections of the through freight go by. When they got the signal they didn't pull out very fast, for they had a good big train. After they got to the switch there was some trouble with the lock, and the fireman had to break it with a hammer, which delayed them. The conductor, Jimmy Phelan, had laid down on the bunk and gone to sleep, expecting the flagman, Sam Reese, would attend to his business, but the boys were tired, it had been hot and they'd been on the jump all day. So everything being quiet, one of them got out the cards, and they sat down to a little game of draw about as soon as they left X Y, knowing that they were going to have a long wait at Monkey Run. Sam Reese had got a full hand, aces up, and was the ace too. So he proposed to make it interesting for the others, and forgot all about his flag. In the meantime the first section of the through freight had got to X Y and the operator, to help things along, squeezed a couple of minutes off the ten, and gave them the 'permissive.' The through freight booms along 30 miles an hour, looking for a flag; Sam thinks, God pardon him, that the 'permissive' will protect him, and so they came together. The engineer and fireman jumped and were not hurt, the boys in the caboose got out just in time and ran up the bank, but poor Jin my has gone to his reward with a month's pay owing him. Whew! coughed the Semaphore as he shook the dust off after the wrecking train had gone by, "I hope the calf who pulls me has not made any mistake. It makes me shiver every time I drop my arm."

"I wonder how a few less rules and a little more gump-tion would work," mused the Crank?

Railroad Sanitation in France.

The Minister of Public Works issued June 1 a circular to the railroad companies on the matter of taking measures to cleanse and disinfect cars and passenger stations. The sum of it is that the cleansing formerly recommended with antiseptic material would be very expensive, the state railroads alone having estimated the cost to that small system at 300,000 francs a year. More economical methods are very likely to be discovered, and, indeed, are being experimented with on the Eastern system. Furthermore, the means taken officially to call attention to the subject have notably diminished the habit of spitting on the floors, and the state railroad administration has provided spittoons in waiting rooms, an example which ought to be followed by other companies. Some of the lines are much used by consumptives, and in these cases special measures should be taken for the disinfection of the cars. The Minister urges that the companies continue to investigate practical methods of cleansing by the use of antiseptics; that they post conspicuous notices forbidding spitting on the floors and rugs of cars and waiting rooms; that they put "hygienic" spittoons in the waiting rooms, and that they make special study of the means of disinfecting on lines which are frequented by consumptives.

South American Notes.

By the new schedule of the Buenos Ayres, Valparaiso & Transandine Railroad Co. the journey from Buenos Ayres, Argentina, to Santiago, Chile, may be made in 74 hours.

It is reported that, prior to entering into the recent treaty with Chile, the republic of Bolivia made tenders to Argentina for a railroad communication with her railroad system, thus giving Bolivia an outlet to the East. The offer not having been acted upon, Bolivia concluded the treaty with Chile, which, it is said, gives to Bolivia the port of Arica, on the Pacific Ocean, and a guarantee of immediate construction of a railroad from Arica to La Paz, and of a prolongation of the Antofagasta & Bolivia line to La Paz. In exchange for this, it is reported that Bolivia cedes to Chile the famous Huanchaca silver mining region, producing about 10,000,000 oz. of silver per annum.

Traffic receipts show important gains on the Peruvian railroads since the settlement of the recent political difficulties, the revenues for May, 1895, being \$60,000 in excess of those for the same month last year. It is reported that as one result of the recent accession of French capital to the interests of the Peruvian Corporation, Limited, the Lima & Oroya Railroad will at once be carried on to the mines of Cerro de Pasco.

The Niagara Falls & Lewiston Railroad.

This new electric railroad, built chiefly for pleasure travel, was opened on July 18, but the first train, carrying a large party of invited guests, including many railroad officers, met with an accident. The rear car, being an old street car with wheels not suitable for high speed, jumped the track at a curve and was overturned, falling partially into the water. Two passengers were injured, one of them, it is feared, fatally. It is said that the electric apparatus not being finished, the train was hauled by a steam locomotive.

A Discovery of Anthracite.

Anthracite coal in a vein 4 ft. thick has been discovered near Pottsville, Pa., on the Line Mountain, which bounds Schuylkill and Northumberland counties. The vein is on the south side of the mountain, near Pitman, in the former county. This is a surprise to coal experts, for it is five miles south of the Shamokin coal basin, and was believed to be outside the coal district.

The Coke Trade.

Coke production and output in the Connellsville region has picked up again. The shortage of open cars is causing some embarrassment. Box cars are plenty. One good feature of the summer season is the abundant supply of water in all parts of the region. In the past three years the drought has been a serious drawback to production during the months of August and early September. The Connellsville region was never more driven than now. The condition of the coke workers has not been better since the boom year of 1890. Practically every available oven in the region is in blast. Shipments average over 1,300 cars a day, and the weekly output is keeping well above the 150,000 ton mark.

New Lake Vessels.

At present there are under construction at lake yards 12 steamers and 2 barges for freight traffic. Among these are the largest vessels ever built for the lakes. They have an aggregate freight capacity of 55,000 tons. Most are built expressly for the ore trade. The average tonnage of these steamers is 80 per cent. greater than the average of the vessels now engaged in the ore business.

Iron Ore Notes.

A strike has paralyzed the iron mining industry on the Marquette range in Michigan. At the time it began last week there had never been such a business for the mines and the railways. The day before the strike was declared the Chicago & Northwestern road issued a new time card, which provided for 208 regular trains from the mines to the docks at Escanaba. These were all taken off and the docks at that place and at Marquette are idle. Shipments from the two places had been at the rate of 800,000 tons a month. The strike is not likely to last long.

At one of the Mesaba range mines, one day last week, one steam shovel loaded from the ore body, 145 cars of ore, of 23 tons each. In five consecutive ten-hour shifts 598 cars were loaded. This is the kind of competition that the new Mesaba makes for the old underground mines.

The Drake & Stratton Co., of New York, have just received a contract from the Biwabic Ore Co., of the Mesaba, for the removal of 300,000 cubic yards of earth, at a price said to be about 35 cents a yard. This will expose for mining several million tons of ore.

Susquehanna and Tide Water Canal.

The York County Court, at Columbia, Pa., has ordered the canal and all the property connected with it to be sold in September. This order applies to the 30 miles in Pennsylvania owned by the Susquehanna Canal Co. The canal in Maryland, 15 miles long, is owned by the Tide Water Canal Co. The northern terminus of the canal is at Columbia, Pa., and the southern is at Havre de Grace, Md.

RAILROAD LAW—NOTES OF DECISIONS.**Powers, Liabilities and Regulation of Railroads.**

In Iowa a private lane was built across a railroad track to enable the owners of land lying on each side of the track to get from one part to the other. The lane was only about 40 rods long, opening on a highway, and was

used by wood choppers going to work, and by persons who went into a timber tract, to get wood, and at one time was used by a person as his only means of access to the highway. The Supreme Court holds that the use was not sufficient to make the lane a highway by prescription, so as to exempt the railroad from liability for failure to fence.¹

In Georgia it is held that under the constitution declaring, that private property shall not be taken, or damaged, for public purposes, without just and adequate compensation being first paid, damage done to land by taking a portion of it for the way of a railroad ranks with the amount allowed for the right of way itself in competition with a mortgage on the railroad to secure other indebtedness of the company.²

In the Supreme Court of the United States it is held that the assessment for taxation of the property, within the state, of a railroad whose road extends outside the state, cannot be adjudged excessive and illegal upon testimony that the valuation was excessive, and that portions of the road outside the state were of largely greater value than any similar length within the state, unaccompanied by evidence that the assessing board reached the valuation by simply dividing the total value of the company's property on a mileage basis, or that it failed to take into consideration such excessive value of portions outside the state.³

In Minnesota the statute requiring railroads to stop all regular passenger trains at county seats is not unconstitutional as interfering with interstate commerce.⁴

Injuries to Passengers, Employees and Strangers.

In New York it is held that where a passenger on a railroad, shortly before reaching his destination, delivered his baggage check to the agent of a transfer company, in order that his baggage might be carried from the depot to his residence, the transfer company and the railroad company are connecting carriers, and the burden is on the transfer company, in an action against it for injuries to the baggage, to show that the injury occurred before it received the baggage from the railroad company.⁵

In the Federal Court it is ruled that a railroad receiving as baggage, without knowledge as to its character, a trunk containing a stock of jewelry, part of which was afterward lost by the wrecking of a train, is liable only for safe-keeping and delivery to the owner, on proper identification, of the articles saved.⁶

In New York plaintiff, a young boy, boarded defendant's street car, intending to ride until the conductor should come where he stood, and then jump off while the car was in motion. The conductor, without being noticed by plaintiff, came to where he was standing, and by a sudden motion and ejaculation frightened him causing him to fall. The Court rules that defendant was liable.⁷

In Kentucky it appeared that plaintiff alighted from defendant's train on the right of the track, where there were neither platform nor lights, and was injured in leaving the yards. The evidence showed that there was a safe and well lighted platform on the left side, of which plaintiff could have known by the exercise of reasonable diligence. It is held by the Court of Appeals that plaintiff assumed the risk.⁸

In Pennsylvania it is laid down that where a passenger in a crowded combination car voluntarily, and in violation of a rule of the company, attempts to get off at a side door, used only for baggage, and is injured, the railroad company is not liable.⁹

In Indiana there was evidence that the train was operated by a conductor, engineer, fireman and brakeman; who were required to remain on duty 19 consecutive hours without any means of getting their meals. As the train drew into A., where it was to be switched to allow another train to pass, the conductor and engineer left the train to get their supper, leaving only the brakeman and fireman in charge. The brakeman got off and turned the switch, but the fireman ran over it and had to back the train, and he being the only one on the train no watch was kept at the rear of the train or bell rung. Decedent (a section master) and his gang, as soon as the train had first passed them, started to put a hand car on the track at a point 190 ft. from the switch, and, on seeing the train backing up, attempted to get it off in time to save it, but were unable to do so; and, in getting away, decedent fell and was run over. The Supreme Court rules that decedent was not, as a matter of law, guilty of contributory negligence.¹⁰

In California it is said by the Supreme Court that occasionally taking a drink or occasionally being under the influence of drink does not constitute such a habit of drinking as would authorize a finding that one was thereby rendered incapable of managing an engine.¹¹

In New York it is the duty of a master to make and promulgate rules for the protection of his servants, and to exercise such supervision over his servants as to have reason to believe that the business is conducted in pursuance of such rules.¹²

In the Federal Courts the fact that a railroad employee was walking on the track when killed is not conclusive of his negligence.¹³

In Michigan the negligence of an employee, in going into a dangerous place, contrary to the rules of his employer, will not be excused because it was customary for other employees to go into the same place.¹⁴

In Missouri, it is held by the Supreme Court that where a division roadmaster directs that the brake staffs be removed from a number of flat cars, and the brakes being thus rendered useless, orders the cars to be loaded with steel rails and left standing near a steep grade on a side track, from which they escape, and, running rapidly down the grade, collide with an approaching train and kill its engineer, the roadmaster is negligent and the company is liable.¹⁵

In Michigan it is negligence for a brakeman, contrary to the rules of the company, to ride on the brake beam of the tender of an ordinary locomotive backing across a trestle at the rate of from five to eight miles an hour; and if, while so riding, he is struck by a gate which is allowed to swing across the track, he cannot recover.¹⁶

In Indiana the fact that an employee knew that part of the train crew were in the habit of leaving the train to get supper did not render him guilty of negligence in placing the hand car on the track in their absence, as, in order to find if they had left, he would have been required to board and inspect the train as it passed.¹⁷

In Arkansas a railroad is not liable for injuries received by one not an employee while riding on its hand car, on which the foreman in charge was forbidden to take any one but an employee.¹⁸

In Illinois a railroad agreed to transport on its line a locomotive engine belonging to another road, and placed it in charge of one of its conductors, who ran it under orders from the train dispatcher, although the mechanical work of running the engine was done by an engineer and fireman of the road that owned the engine. The Supreme Court rules that the company over whose road the engine ran was responsible for its loss, caused by violation of orders of the train dispatcher, since that company was in sole control of the engine.¹⁹

In New York it is held that where plaintiff, at any time after reaching a point 50 ft. from the crossing, could have seen the locomotive by which she was injured at the distance of 1,000 ft., if she had looked, a nonsuit should be granted, though plaintiff testifies that she stopped before going on the track, looked and listened, and continued to look until she went on the track.²⁰

In Indiana it is not necessarily negligent for a boy to walk on a station platform within a foot and a half of a train moving two miles an hour.²¹

- ¹ Breneman v. B. C. R. & N., 60 N. W. Rep., 173.
- ² Central Trust Co. v. Thurman, 20 S. E. Rep., 141.
- ³ C. C. & T. L. v. Backus, 14 St. Ct., 1114.
- ⁴ State vs. Gladson, 59 N. W. Rep., 187.
- ⁵ Myerson v. Woolverton, 29 N. Y. S., 737.
- ⁶ Wunch v. N. P., 62 Fed. Rep., 878.
- ⁷ Ansteth v. Buffalo Ry. Co., 30 N. Y. S., 197.
- ⁸ L. & N. v. Ricketts, 27 S. W. Rep., 860.
- ⁹ De Ry v. C. & A., 30 Atl. Rep., 162.
- ¹⁰ Penn. Co. v. McCaffrey, 38 N. E. Rep., 67.
- ¹¹ Cosgrove v. Pitman, 37 Pac. Rep., 232.
- ¹² Warn v. N. Y. C. & H. R., Sup. 20 N. Y. S., 897.
- ¹³ Craft v. N. Pac. 62 Fed. Rep., 735.
- ¹⁴ Benage v. L. S. & M. S., 60 N. W. Rep., 286.
- ¹⁵ Browning v. W. W. R., 27 S. W. Rep., 644.
- ¹⁶ Benage v. L. S. & M. S., 60 N. W. Rep., 286.
- ¹⁷ Penn. Co. v. McCaffrey, 38 N. E. Rep., 67.
- ¹⁸ H. C. A. & N. v. Bolling, 27 S. W. Rep., 492.
- ¹⁹ T. H. & L. v. C. P. & St. L., 37 N. E. Rep., 915.
- ²⁰ Sopp v. Fitchburg, 29 N. Y. S., 1003.
- ²¹ N. Y. C. & St. L. R. Co. v. Mushrush, 37 N. E. Rep., 351.

LOCOMOTIVE BUILDING.

Five engines have recently been ordered by the Chicago, Rock Island & Pacific.

The Pittsburgh & Lake Erie recently turned out two new engines at the McKees Rocks shops.

The Delta Construction Company, of New Orleans, La., is in the market for three mogul locomotives.

The Chicago, Burlington & Quincy is building at its shops in Aurora, West Burlington and Havelock about 25 locomotives.

The Siemens & Halske Co., proprietors of the shops near Chicago, that were built for the Grant Locomotive Works, state that they expect to make locomotive building an important part of their business.

The Lake Shore & Michigan Southern has awarded the contract for the 30 ten-wheel locomotives mentioned last week, to three shops; to the Schenectady Locomotive Works, 10; to the Pittsburgh Works 10, and to the Brooks 10.

Our issue of the 19th contained engravings made from general drawings of the consolidation locomotives built by the Rhode Island Works for the New York, New Haven & Hartford Railroad. In the brief description we spoke of our previous publication of a photograph and specifications of one of these engines as being "one of a lot of ten." The fact is 25 were built and delivered.

The Dickson Manufacturing Company, of Scranton, Pa., is completing three large locomotives for the Delaware & Hudson. These locomotives are hard-coal burners and the heaviest passenger engines the Dickson company has built. The diameter of the boilers is 60 in. and a pressure of 180 lbs. can be carried. The cylinders are 19 x 24 in. The driving-wheels are 68 in. in diameter and of cast steel. The engines have an automatic arrangement for oiling the trucks, driving-boxes, links and valve motion while the engine is running. Each locomotive weighs 120,000 lbs.

CAR BUILDING.

The Cleveland, Lorain & Wheeling is in the market for from 500 to 1,000 coal cars.

The Augusta Southern has ordered six passenger cars from the Ohio Falls Car Co.

The Billmyer & Small Company, York, Pa., has shipped 48 narrow-gauge platform cars to a Western Pennsylvania road.

It is reported that the receivers of the Philadelphia & Reading are negotiating with the Pullman Palace Car Co., to build 1,000 more freight cars.

The Lake Shore & Michigan Southern has just ordered 500 standard box cars as follows: 250 from the Wells & French Car Co.; 250 from the Michigan Peninsular Car Co.

The Calumet & Blue Island is to let the contract this week for 200 box cars of 30 tons capacity, 34 ft. long, equipped Westinghouse airbrakes and M. C. B. automatic couplers.

The Queen & Crescent has ordered from the Ohio Falls Car Co., besides the box cars already mentioned, 50 platform cars. The box cars have Winslow roofs and Q. & C. doors. One hundred and twenty box cars were also ordered for the Alabama Great Southern which have plastic roofs and Moore doors.

The Kansas City, Pittsburgh & Gulf has ordered three passenger, three chair and three baggage cars from the Barney & Smith Manufacturing Co. These cars will have Buhoup-Miller couplers and French springs. They will be finished inside in oak and will have Pintsch gas lamps.

The Pennsylvania has placed another order for box cars to be delivered during August and September. The Ohio Falls Car Manufacturing Company, of Jeffersonville, Ind., will make 300, and the St. Charles Car Company, of St. Charles, Mo., 200. These cars will have National hollow brakebeams, Winslow roofs and Wagner doors.

BRIDGE BUILDING.

Allenwood, Pa.—The Commissioners of Union and Northumberland Counties have awarded the contract for the construction of the joint bridge across the West branch of the Susquehanna, at Allenwood, to Smith and Champion, Mahanoy City, Pa. Their bid was \$36,500 and includes the superstructure and the masonry. They will begin work at once. Sixteen bids were presented.

Appleton, Wis.—The Valley Terminal Railroad of Wisconsin, is to build a large iron bridge over the Fox River at this place, and will also construct a number of smaller bridges and trestles. Walter B. Pelton, Appleton, Wis., is Treasurer of the company.

Atlanta, Ga.—The Edge Moor Bridge Co., of Wilmington, Del., has begun work on the Broad street bridge.

Bridgeton, N. J.—Mr. Albert Lucius, of 71 Broadway, New York City, has prepared plans for a new bridge across the Cohoes River at Broad street. The South Jersey Traction Co., desiring to run street cars over this bridge, will bear a portion of the cost of the structure.

Buffalo, N. Y.—State Engineer Adams will at once prepare plans for a bridge across the Erie Canal at Porter avenue.

Denver, Colo.—H. A. Sumner, State Engineer, will receive bids until July 31 for a bridge to be built across White River near Rangely. The legislature appropriated \$3,500 for the bridge, including foundations.

Elizabeth, Pa.—The Pittsburgh & Lake Erie is constructing a new iron bridge below Elizabeth and making a number of other improvements on its McKeesport & Bellevue division.

Harwich, Ont.—The Hamilton Bridge Company has the contract for constructing a steel bridge, 110 ft. long, over McGregor's Creek.

Hempstead, Tex.—The Chicago Bridge & Iron Co. has secured the contract for a bridge across the Brazos River at Hempstead, Tex., to cost about \$18,000.

Johnstown, Pa.—Council has passed the ordinance providing for the erection of the Maple avenue bridge.

Leechburgh, Pa.—The Leechburgh Bridge Co. was chartered at Harrisburgh, July 22, with a capital stock of \$20,000 to build a toll bridge over the Kiskiminitus River from a point in Gilpin, Armstrong County, to a point in Allegheny. Joseph Beale holds 306 of the 400 shares.

Lewisburg, Pa.—The contract for the bridge over Little Buffalo Creek, in Kelly Township, at Dieffenderfer's was let last week to the King Bridge Co. for the iron work at \$720. The bridge will be 60 ft. long and the roadway 16 ft. wide. Work will be commenced at once.

Lock Haven, Pa.—The commissioners have decided to build a new county bridge in Porter township near Krider's siding. Proposals for the masonry will be received up to Aug. 20.

Luzerne, N. Y.—The town officers of Corinth and Luzerne have awarded the contract for the new bridge across the Hudson River to the Owego Bridge Company, of Owego, N. Y., for \$14,585. The bridge is to be a full Pratt truss, 16 feet roadway, 572 feet long, divided into three spans. The roadway will be 20 feet above low water. The contract calls for the completion of the bridge within 90 days.

Nashville, Tenn.—The Board of Public Works will solicit bids for a new bridge over Cedar street, near Bostick.

Niagara Falls.—As we have heretofore announced, it has been decided to build at once the abutments for the new steel arch bridge to be built across the Niagara gorge from the designs of Mr. L. L. Buck. It is expected that bids will soon be asked for these abutments. It is not believed that the superstructure will be begun before next spring.

Ottawa, Ont.—The bill incorporating the Deschenes Bridge Company has passed. The company intends to construct a bridge over the Ottawa River at Deschenes Rapids. The capital of the company is \$500,000. The head office is to be at Ottawa.

Peterborough, Ont.—Contracts for steel bridges over Salmon and Tusket rivers have been made with the Central Bridge and Engineering Company.

Philadelphia, Pa.—The Shiffler Bridge Company, of Pittsburgh, has been awarded the contract for a large iron bridge to span the tracks of the Philadelphia & Reading, at Philadelphia. Last week this company turned out a girder 122 ft. long and 10 ft. deep, weighing more than 50 tons.

Plans have been prepared for a double deck steel bridge across the Schuylkill River at Gray's Ferry, and it is said that the City Director of Public Works expects to get an appropriation for its construction within a few weeks. The existing bridge, which is an old one, is owned by the Pennsylvania Railroad.

Pittsburgh, Pa.—July 23, at Harrisburgh, the Allegheny & Chartiers Valley Bridge Co. was chartered with a capital of \$5,000 to build a toll bridge over the Ohio River from the foot of Greenwood street to Esplanade on the opposite shore. The directors are: Harding Kimberland, Henry J. Wenke and D. H. Ferrel.

Raleigh, N. C.—Arrangements are being made between the city authorities of Raleigh and the Seaboard Air Line for the construction of a bridge across the railroad at Morgan street. W. W. Gwathmey is Chief Engineer of the railroad, Portsmouth, Va.

Reading, Pa.—The County Commissioners have decided to build a new bridge in Greenwich township, across the Saucony Creek.

San Francisco, Cal.—The San Francisco Bridge Co. has just closed a contract for building two bridges in the Hawaiian Islands, and also a contract for building a \$20,000 iron bridge at the Presidio, for the United States Government.

Sioux City, Ia.—Work has been begun on a new pontoon bridge across the Missouri between Sioux City and Covington, Neb. A portion of the bridge, across the sandbar, will be fixed, and piles are now being driven for it.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Ohio, 3 per cent. on the common and preferred stock, payable July 31.

Cornwall & Lebanon, 2 per cent., payable July 29.

Illinois Central, semi-annual, $2\frac{1}{2}$ per cent., payable Aug. 31.

Lake Erie & Western, quarterly, $1\frac{1}{4}$ per cent., payable Aug. 15.

Nashville, Chattanooga & St. Louis, 1 per cent. on its capital stock.

Pullman Palace Car Co., quarterly, \$2 per share, payable Aug. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Engineers' and Architects' Association of Southern California meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The Engineers' Society of Western New York holds regular meetings the first Monday in each month, ex-

cept in the months of July and August, at the Buffalo Library Building.

The Western Railway Club meets in Chicago on the third Tuesday of each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Westeyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The Western Society of Engineers meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736-1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Westeyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at the Cumberland Publishing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 26 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The Western Foundrymen's Association meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The Association of Civil Engineers of Cornell University meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

The New Interchange Association.

The new Interchange Association will hold a meeting on Tuesday, July 30, at 10 a. m., in the Auditorium Hotel, Chicago. A full attendance of members is especially desired.

Engineers' Society of Western New York.

Last week we published a brief report of the last meeting of this new society. The officers are: Geo. E. Mann, President, No. 4 Municipal Building; E. B. Guthrie, Vice-President; Walter McCulloh, Vice-President; Geo. R. Sikes, Secretary and Treasurer, No. 122 Pearl street; C. M. Morse and G. B. Burbank, Directors, all of Buffalo.

Western Foundrymen's Association.

The regular monthly meeting of the Western Foundrymen's Association took place at the Great Northern Hotel at 7:30 p. m., July 17. There was a great attendance of members and visitors.

The Association has recently been incorporated under the laws of the state of Illinois.

Mr. Vrooman read a short paper outlining work for the Association and embodying some proposed changes in the constitution and by-laws. A discussion on the paper was held.

A committee of three were appointed to investigate the matter of permanent quarters for the club and report at the next meeting.

General Baggage Agents' Association.

The American Association of General Baggage Agents held its 14th semi-annual meeting at Buffalo last week. About 50 members were present. Among the subjects discussed were the allowance of free baggage to passengers going across the Pacific Ocean, which over the Canadian Pacific is 350 lbs., and seals for trunks, to be used in checking over long distances, to locate concealed losses. Nothing definite was brought out on either of these subjects. Mr. Dearing, of the Michigan Central road, read a paper advocating the use of red and blue cards for excess baggage, red for prepaid and blue for C. O. D. This use of these colors is now quite common, but some roads use blue for prepaid, creating confusion. Mr. Taylor, of the International & Great Northern, advocated the use of string checks in place of strap checks for baggage going far from the

originating road. Such checks are as safe as special shell checks and cost only \$5 a thousand. They can be quickly handled where there is a rush of baggage, as the filling out of the stub obviates the necessity of making a hurried entry on the record book. A committee recommended the Delaware & Hudson's form of release. Notice was given of a motion to change the date of the meetings of the Association to the third Wednesday in October annually.

PERSONAL.

—Mr. P. B. Groat, General Emigration Agent of the Northern Pacific, has resigned.

—Mr. H. S. Hawley, General Agent of the Chicago & Northern Pacific, Chicago, has been appointed Treasurer of the company.

—Mr. C. H. Phillips, Agent of the Missouri Pacific at Cincinnati, has resigned his position, and is now connected with the United Press at 195 Broadway, New York City.

—Mr. Thomas Bell, formerly Secretary of the Charles Scott Spring Co., and later Vice-President of the National Car Spring Co., is now with the Bries Steel Wheel Co., of Scranton, Pa.

—Mr. George W. Bartlett, formerly General Superintendent of the Buffalo, Rochester & Pittsburgh Railroad, has been appointed General Manager of the Centralia & Chester, a short Illinois road.

—Mr. J. H. Jones, who recently resigned as General Superintendent of the Ulster & Delaware, which position he had held since 1881, has been appointed manager of the Champion Steam Joint Reamer & Grinder Co., of Rondout, N. Y.

—Mr. A. R. Shindler has been appointed Assistant Chief Engineer of the San Francisco & San Joaquin Valley Railroad, with office at San Francisco. Mr. Shindler comes from the Southern Pacific, having been Resident Engineer of that company at Tucson, Ariz.

—Mr. Alexander H. Notman has been appointed District Passenger Agent of the Canadian Pacific at St. Johns, N. B., to take the place of Mr. McPherson, who has been promoted to be Assistant General Passenger Agent at Toronto. Mr. Notman has been Chief Clerk in the General Passenger Agent's office at Montreal.

—Mr. George W. Greene, who was until about two years ago President of the New York & New Jersey Construction Co., died in New York City on July 21, at the age of 65. Mr. Greene was a prominent member of the New York Legislature, and introduced the bill authorizing the construction of the New York & New Jersey bridge. Subsequently he became Vice-President of the Bridge Commission.

—Mr. Samuel G. Artingstall has resigned his position as City Engineer of Chicago, on account, it is said, of disagreements between himself and the Commissioner of Public Works concerning the management of his office. Mr. Lewis B. Jackson has been appointed to succeed him. Mr. Jackson was born at Willington, La Salle County, Ill., and has been actively engaged in bridge and railroad construction for a number of years.

—The vacancy on the Massachusetts Board of Railroad Commissioners has been filled by the appointment of Mr. George W. Bishop, Roadmaster of the Vermont & Massachusetts Division of the Fitchburg Railroad, at Ashol, Mass. Mr. Bishop is 46 years old and has been on the Fitchburg road nearly thirty years. He began as brakeman, then fired a while and became a section foreman in 1870. He was appointed Roadmaster in 1874. He is well known as a prominent member of the New England Roadmasters' Association, of which he has been President. He is also a prominent Free Mason and Odd Fellow, and has held various local political offices.

—Mr. Benjamin P. Cheney, one of the largest stock and bondholders of the Atchison, Topeka & Santa Fe Railroad, and prominent in the Northern Pacific Railroad and the American Express Co., died at his home in Wellesley, Mass., on July 23 at the age of 80. Mr. Cheney was born in Hillsboro, N. H., and in early life was a stage driver. He became interested in the express business, and was associated with Harnden, Adams and Dinsmore. He started the United States & Canada Express Co., which was absorbed by the American in 1881, and was a director of the American. His son, B. P. Cheney, Jr., has taken a prominent part in the management of the Atchison road during the last two years, and he is now a director in various companies, having taken these places in consequence of his father's failing health.

ELECTIONS AND APPOINTMENTS.

Astoria & Columbia River—The President of this road is A. B. Hammond and his office is at Astoria, Or.

Baltimore & Ohio Southwestern—W. Hodgden has been appointed Assistant General Freight Agent, with headquarters at St. Louis, Mo., in charge of the Mississippi Division, North Vernon, Ind., and West, including Louisville and Springfield Divisions and Bedford Branch.

E. P. Ruhrah has been appointed Assistant General Freight Agent at Cincinnati, O., in charge of the Ohio Division, including Marietta, Portsmouth and Hillsboro Divisions, also the Mississippi Division, east of North Vernon, Ind.

F. E. Janowitz has been appointed coal traffic agent, with headquarters at Chillicothe, O., in charge of coal traffic from all mines on the Ohio Division.

C. E. Walker, formerly master mechanic of the Toledo, St. Louis & Kansas City road, has been appointed division master mechanic in charge of the Mississippi Division in place of E. E. Jenks, transferred to Seymour, Ind.

Brockville, Westport & Sault Ste. Marie—At the annual meeting held in Brockville, Ont., July 18, the following persons were elected Directors for the ensuing year: James G. Leiper, Philadelphia, Pa.; Samuel Hunt, Cincinnati, O.; W. G. Parish, Athens; W. C. Fredenburg, Westport; Colonel Cole, D. W. Downey, Geo. R. Webster, Geo. H. Weatherhead, Robt. Bowie, D. Derbyshire and James Mooney, Brockville. At a subsequent meeting of the Board officers were elected as follows: President, J. G. Leiper; Vice-President, Colonel Cole; General Manager, S. Hunt; Treasurer, Superintendent and General Freight Agent, Jas. Mooney; Secretary, General passenger Agent and Traveling Auditor, E. A. Geiger.

Chester & Lenoir—The stockholders last week elected Major G. W. F. Harper President and the following directors: A. G. Brice, J. L. Aggers, J. F. Wallace, P. G. Moore, C. E. Spencer, J. B. White, J. A. Martin and V. E. McBee. Major Harper was also elected Treasurer.

Up to two years ago this road was operated under a lease by the Richmond & Danville, but it is now operated by its own stockholders.

Duluth Transfer.—The annual meeting was held at Duluth, July 16, and the following directors were chosen: Thomas Kurtz, Thomas G. Hillhouse and C. C. Cuyler, of New York; J. A. Willard, of Mankato, Minn.; J. L. Washburn, O. H. Simonds and J. A. Molica, of Duluth. Thomas Kurtz, of New York, was elected First Vice-President; J. A. Willard, of Winona, Second Vice-President, and J. A. Modica, of Duluth, Secretary and Treasurer. No president was elected.

Indiana, Decatur & Western.—The Directors of the reorganized company are: William G. Outten, Henry P. Page, Wilburn Harwood, all of Decatur, Ill.; two years, Barsford K. Durfee, Decatur; Jas. A. Eads, Paris, Ill.; Robin Smith, New York; three years, Henry W. Smith, Theodore W. Morris, and Francis S. Smith, all of New York.

Lehigh & Hudson River.—John E. Barrett has been appointed Superintendent of Tracks, Buildings and Bridges, vice George B. Harris, resigned. The office is at Warwick, N. Y.

Mahoning Coal Railroad.—The President of this company is D. W. Caldwell, Cleveland, O.; Treasurer, N. Bartlett, and Secretary, D. F. Lillis.

Panama.—George Whaley has been appointed Vice-President and General Manager, with office at 29 Broadway, New York City.

Sebasticoak & Mooshead.—At a meeting of the stockholders last week the following officers were elected for the ensuing year: Directors, Z. D. Lancaster, Frank W. Hovey, E. C. Bryant and T. M. Griffin, all of Pittsfield, Me., and Amasa J. Moss, of Hartland; Secretary and Treasurer, Frank W. Hovey. The office of the company is at Pittsfield.

Southern Pacific.—D. T. Forbes, appointed General Superintendent of the New York, Texas & Mexican and the Gulf, Western Texas & Pacific, will assume the duties of his new office on Aug. 1. The San Antonio Division, of which Mr. Forbes has been Superintendent, will be abolished and the territory will be divided between the El Paso and the Houston divisions.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Alameda & San Joaquin Valley.—The first contract for this road, an order for 100,000 ties, has been given to J. P. Kimball, of the Crescent City Lumber Co. The line will be 30 miles long, establishing connection between the coal mines of the San Francisco and San Joaquin Coal Co., and the San Joaquin River, near the dividing line between San Joaquin and Contra Costa counties, California.

Astoria & Columbia River.—The Chief Engineer of this company, which proposes to build a railroad along the south bank of the Columbia River from Astoria, Or., eastward to Goble, is Mr. W. H. Kennedy. The organization formed to build this road is called the Northwest Construction Co., and it will soon let contracts for the grading. There is considerable heavy work on the line, and there will be three tunnels each about 600 ft. long. It is estimated that the length of trestle required will be about 10 miles. The Seashore Railroad, extending about 14 miles out of Astoria, which the company bought, is now being operated from the west side of Young's Bay to Clatsop Beach. The company is preparing to build at once a bridge across Young's Bay to connect the new with the existing line. This bridge will have a steel draw span 130 ft. long.

Atlantic & Lake Superior.—The bonds of the company having been withdrawn from the London market, work has been suspended for the present on the section between Montreal and Quebec, on which operations were begun last month.

Bayfield & Western.—This company has filed articles of organization with the Secretary of State, at Madison, Wis., to construct a road from some point on Lake Superior at or near Bayfield to the east fork of Sand River, in Bayfield County, thence southwest to the Minnesota State line, a distance of about 100 miles. The capital stock is \$5,000,000. The directors are I. H. Wing, R. D. Pike, William Knight, A. J. Mussell, O. Flanders, G. Bell, A. Packard, F. Boutin, H. Hannum, E. Leiby, Fred Fisher, Robert Inglis and W. W. Downs, all of Bayfield.

Blaine, Nooksack & Eastern.—Surveys are being made for a road to connect the town of Blaine, Wash., on the Great Northern Railway, with Sumas, on the Burrard Inlet & Fraser Valley. The distance between these towns is about 23 miles, the line running due east from Blaine. Arrangements are being made for the construction work.

Charleston, Clendennin & Sutton.—This company has completed its tracks to Queen's Shoals, on Elk River, and has trains running through from Charleston, W. Va., to that point. The contractors are at work five miles further up Elk River, and have the track laid to that point, though it has not been opened for traffic. Gangs of men are building depots, sidings and storage buildings all along the line, even in advance of the track-layers. The grading forces are at work at Porter's Creek, and are making rapid headway. It is now given out that the road will be completed as far as Clay Court House, and trains will be running regularly from Charleston to that point by the first of October at the latest, though it is hoped to have the work completed by the middle of September. The right of way has been nearly all secured to Sutton, Braxton County, and the management has in contemplation the putting of another force to work on the other end of the line.

Chesapeake & Western.—Forty-two miles of this road, which is to extend west from the Chesapeake bay, through Fredericksburg and Harrisonburg, Va., to the West Virginia coalfields, has been graded, and 40 miles additional is now being graded. The contractors are the Ferguson Contracting Company, E. Purcell, Jr., & Co., and Van Akin & Hays, all of whom are subcontractors under the Old Dominion Construction Co. Van Akin & Hays have the contract for building the line through Rockingham County, west of Harrisonburg, into West Virginia, crossing the Shenandoah Mountains. About 1,000 men are now at work, and five miles of track has been laid since July 10. The cash capital is \$500,000, all subject to call of directors as needed. The maximum grade is 79.2 ft. per mile, and the maximum curve 7 deg. Twenty miles of 80-lb. rails are now on hand. O. H. P. Cornell is Chief Engineer. The President is J. W. Reinhart, the Secretary James Gilfillan, and the Treasurer F. W. Jackson. The New York address of the road is 15 Broad street.

Chester, Laclede & Western.—This Missouri railroad, which is projected to extend westward from a point on the Mississippi River opposite Chester, Ill., is now reported to be under construction for a considerable distance. Colonel Richard Southerd, Chief Engineer of the company, says that the contract for grading 70 miles has been let to O'Connor & Dowling, who have sublet the work in 3-mile and 5-mile sections to Messrs. Scott, Bethune, O'Neill, Chase, Webb, Martin and others. The Chief Engineer says that he will have 50 miles more ready to let shortly. He also says that he expects to finish the road and run trains through to Fort Scott, Kan., by the first of January, a statement which will probably bear a little dilution.

Coudersport & Port Allegheny.—The grading on the extension of this road to Ulysses has been carried out along about half of the line, and tracklaying is now in progress. The company expects to have trains running by the first of September. The extension in question will run northeast from Coudersport to Ulysses, about 16 miles, connecting with the Fall Brook Railway at the latter point.

Depew & Tonawanda.—At the hearing before the New York State Railroad Commissioners last week there was no opposition to the petition of this company, and a certificate was granted authorizing it to construct its line under the general railroad law of the state. The applications presented by the two companies desiring to build from Depew southwestward were heard, but no decision was made as the two lines are practically parallel.

Iron Mountain.—The Iron Mountain Railway Co. has been incorporated in California to build a railroad from the Iron Mountain mines to Spring Creek, on the California & Oregon Railroad, a distance of 13½ miles, and a branch about 4 miles long to Copley. The entire line is in Shasta County. The capital stock is fixed at \$100,000, and it is stated that the motive power will be steam or electricity. Among the directors are L. B. Parrott and Charles P. Eels, of San Francisco. Most of the capital is to be furnished by the Mountain Mines Corporation, which is owned chiefly in England.

Jacksonville, St. Augustine & Indian River.—The President of the company confirms the report that construction work will at once be begun on the extension of the road from the present southern terminus at West Palm Beach, Fla., to Miami, 70 miles farther south. The surveyors arrived at Miami on July 16.

Kentucky Southern.—This company has been incorporated in Kentucky with a capital stock of \$50,000, to build a railroad from a point near Mount Vernon, which is on the Louisville & Nashville, about 129 miles southeast of Louisville, southward, about 37 miles, to the mouth of Rockcastle River. Mr. G. L. Prescott, of London, Ky., is president of the company. He expects that the road will be built this fall. The line lies through valuable coal lands in the Rockcastle valley, which, it is said, are to be developed by the Prescott Land Co., an English corporation.

Mississippi, Colesburg & Manchester.—This line will be about 36 miles long, running from Turkey River station, Ia., on the Chicago, Milwaukee & St. Paul, northeast to Manchester. The surveys for the line are now being made.

Montgomery & Prattville.—A large force of laborers is now at work upon this line, and it is hoped that it will be in operation by the first of next October. The road is to extend from Coosada station, on the Louisville & Nashville, nine miles north of Montgomery, Ala., to Prattville. Hitherto manufacturers in the latter town were forced to haul their goods to Montgomery in drays. The road will thus be of great advantage to that section.

Muskogee, Oklahoma & Western.—Press reports say that grading is about to begin on this road, the charter for which was granted in April of this year. The company proposes to build a road westward about 200 miles from Muskogee, I. T., passing through Perry, Oklahoma. G. W. Sutton is President.

Nashville & Mississippi Delta.—This road, which is projected from Grenada, Miss., east to Amory, or Nettleton, on the Kansas City, Memphis & Birmingham, a distance of about 85 miles, has been partly graded on the section between Okolona and Houston, also on the section between Grenada and Graysport. These graded portions of the line comprise about 42 miles. The object of the road is to develop the valuable timber lands of the section through which it runs. It will make good connections with the Illinois Central, the Kansas City, Memphis & Birmingham and the Mobile & Ohio.

New York & Pennsylvania.—This company was incorporated with the Secretary of State at Albany, N. Y., July 22, to build a railroad beginning at the State line in the town of Willing, near the village of Genesee, Allegheny County, and running thence to the Canisteo Valley, in the town of Hornellsville, Steuben County, a distance of 30 miles. The capital is \$300,000, and the directors are Theodore Cobb and William Cobb, of Springville; M. S. Chase, of Whitesville; J. N. Pack, of Coudersport, Penn.; W. W. Crittenden, of Oswego; G. M. Webster, of Greenwood; William Richmond and B. M. Connell, of Hornellsville, and William G. Porter, of Canisteo. The company's principal office will be in Hornellsville.

Ohio River & Charleston.—Mr. A. Tripp, General Manager of this road, says that the road (formerly the "Three C's") is now completely reorganized and that several extensions of the road are in contemplation, including one to the Tennessee coalfields.

Peninsula Railway Co.—This company has been organized in Seattle, Wash., for the purpose of constructing a railroad from Shelton, Wash., to the Pacific Ocean and to the Straits of Juan de Fuca. The company will also own and operate steamboats, etc., in connection with the line. The capital is \$300,000, and the incorporators are George F. Gund and Alfred H. Anderson. The distance from Shelton westward to the Pacific is about 50 miles, while the distance northward to the Straits of Juan de Fuca is about 60 miles.

Pennsylvania.—The engineering department is preparing to begin work on the construction of the Fairhill branch, a short line, less than a mile long, in the northeastern part of the city of Philadelphia. It will connect a number of factories with the New York Division of the road. There will be three bridges over streets and one large bridge will be required to carry a street above the railroad.

Pittsburgh & Eastern.—A contract for 45 more miles of this road was let on July 19. The road is an independent corporation, and its plans contemplate a line from Meaffey, Pa., on the Beech Creek road, to Pittsburgh, making connection with the Boston & Ohio. The main line and branches comprise about 150 miles of road, and

its object, as we have before said, is to open up the undeveloped parts of Indiana, Westmoreland and Cambria counties, Pennsylvania. The Vice-President, Mr. S. H. Hicks, says that the road will be completed to Saltsburg before next winter.

Queen Anne.—The organization of the Peninsula Construction Co., to build this road, was announced last week. The officers of the road say that the stock of the company offered to the public has been largely over subscribed and that the construction company will give out contracts for the work this week. Mr. W. H. Bosley, of Baltimore, is President of the railroad company.

Red Mountain.—The Railway Committee of the Canadian Government has approved the charter of this road, which is to extend from Rossland, B. C., to Northport, Wash.; also the charter of the Trail Creek and Columbia River road, which is projected to run from Rossland to the Columbia River at Trail Creek.

St. Stephen & Milltown.—The contract for the construction of this short New Brunswick railroad, heretofore referred to as the Milltown & St. Stephen, has been awarded to Loran Thomson and Osborn Budd. Milltown is about 5 miles up the St. Croix River from St. Stephen and is opposite Milltown, Me.

Sierra Valley & Mohawk.—This company, whose incorporation was noted in the *Railroad Gazette* of Jan. 18 last, page 45, has completed about 20 miles of its track and opened that portion of its road for business. It is said that the rails have been ordered for eight miles more and that this additional road will be built within a few months. This line is in the northeastern part of California. It begins at Chat, which is on the Nevada, California & Oregon Railroad, about 30 miles north of Reno, Nev., the junction of the latter road with the Southern Pacific. The Sierra Valley extends northwestward from Chat, through Plumas County, to the summit of Beckwith Pass, thence westerly to the town of Mohawk. The track is 3 ft. gage, the same as that of the Nevada, California & Oregon.

Sonoma, Mendocino & Humboldt.—The incorporation of this road was mentioned in these columns on July 12. The projectors say that it will be a standard gage line from Healdsburg, Cal., north, through Dry Creek and Anderson Valley to Eureka. The surveys have been made. The length will be about 170 miles, and there will be in addition a branch line from Fort Bragg to the coalfields at Round Valley. The capital stock of the road is \$3,250,000.

Toledo & Ohio Central.—The belt line of this company, which extends 10½ miles around Columbus, and has been building for the last year, was opened for business July 21. The road connects Columbus with the old main line from Toledo to the Ohio River, Columbus not being on the main line. The improvements embrace the building of a double track bridge over the Scioto River and a new freight house and terminals at Columbus.

Toronto, Hamilton & Buffalo.—M. P. Chapman & Co., of Watkins, N. Y., have taken the contract for grading 40 miles of this road, extending from Hamilton, Ont., southeastward toward Welland. The contractors agree to have the grading done by Sept. 15.

Unadilla Valley.—This road, referred to in our issue of June 28 as practically completed to the southern terminus at New Berlin, making a total length of 19½ miles, was formally opened for traffic July 25. The line has been in operation for more than six months between Bridgewater and South Edmeston, N. Y., a distance of 15 miles, and it was expected that the entire road would be running by May 1 last; but heavy snow and rainstorms delayed the construction work on the unfinished part. The last spike, made of silver, was driven yesterday with a good deal of ceremony. The residents of towns for miles around assembled at New Berlin to witness the driving, and the entire afternoon was given up to a large parade and various kinds of sports. Mr. F. F. Culver, General Manager of the road, personally superintended the handling of trains on the day of the celebration.

Virginia Coal & Iron Co.—Work has been begun on an extension of the railroad of this company which is located at Big Stone Gap. The road will be six miles long, and will connect the property of the iron company with the Louisville & Nashville. It is stated that 500 coke ovens will be built by the company.

GENERAL RAILROAD NEWS.

Atlantic & Pacific.—The United States Trust Co., trustee under the first mortgage, has filed a bill in the United States Court at Albuquerque, N. M., asking for the foreclosure and sale of the property. No interest has been paid on the first mortgage since the road went into the hands of receivers a year and a half ago. The road owned by this company extends from the Rio Grande River, 13 miles west of Albuquerque to the Columbia River, which is the eastern boundary of the State of California, a distance of 565 miles. It is expected that the present action will be followed by an application for a separate receivership, no agreement with the Atchison Reorganization Committee having been arrived at. The Mercantile Trust Company, trustee under the second mortgage, and the Union Trust Company, representing the Atchison interests, will oppose the motion which will be made for a separate receiver for the property, on the ground that it would be prejudicial to their interests in the property. The road at present is in charge of the same receivers as the Atchison and the St. Louis & San Francisco, having been placed in their custody in a suit brought by the Mercantile Trust Company. The bonds secured by this mortgage, as well as the greater part of the common stock of the Atlantic & Pacific, are assets of the Atchison and Frisco companies, who joined in the construction and operation of the Atlantic & Pacific.

Atchison, Topeka & Santa Fe.—The Union Trust Co. has filed with the Court an application to set aside the agreement by which the road pays \$150,000 a year rental for property which, it is claimed, the company really owns. The property in question is the Chi ago terminal used by the road. The rental is the result of the agreement with the Chicago Elevated Terminal Railway Co., which contracted to buy the property, by which Atchison was to pay an annual rental of \$650,000 and all taxes on the property, until the purchase money was paid; Atchison was then to deduct \$342,000 a year as interest; also \$100,000 and \$96,000, respectively, as rentals on leases to the Chicago & Western Indiana and the Chicago & Grand Trunk, leaving \$150,000 rental to be paid by Atchison. The Trust Company alleges that no consideration was paid by the Terminal Company and that Atchison has continued in possession. It wishes to restrain any further recognition of the contract and to recover the rental already paid.

Central of Georgia.—The receivers have appealed the Georgia tax suit to the United States Supreme Court. This suit is to resist the payment of local taxes amounting to about \$15,000. By the terms of the charter the capital stock of the company, representing so much of the railroad line as extended from Savannah to Macon, was exempted from a tax in excess of one-half of 1 per cent. of the net income thereon; but counties and cities were authorized to tax other property belonging to the corporation situated within their limits at the same ratio as was assessed against other similar property.

Until the passage of the Greer law, in 1889, no tax other than the half of 1 per cent. on the net annual income was assessed against the railroad, and the receivers of the property contended that no other tax should be levied and collected. Judge Emory Speer, in an exhaustive opinion, reviewed the history of the case and examined the contentions of both parties. He decided, in effect, that the half of 1 per cent. tax on the capital stock set out in the charter was for state purposes only that the cities and counties on the line were authorized to levy and collect taxes upon the real property of the corporation, and that the Greer law was constitutional. A decree was therefore entered, directing the receivers to pay \$14,798, taxes for the year 1891, with interest at 7 per cent., from Dec. 20, 1891. From this decree and judgment the receivers appealed.

Chicago & Alton.—The Peoria & Pekin Union has voted to allow the Chicago & Alton to run over its tracks into Peoria, and it is said that trains will be put on at once. The Alton's branch, leaving the main line at Dwight, extends to Washington, which is 12 miles east of Peoria.

Easton & Northern.—The stockholders at a meeting held last week in Philadelphia, voted to increase the capital stock from \$200,000 to \$300,000. The road, which is controlled by the Lehigh Valley, extends from Belfast to Easton, Pa., a distance of eight miles, and is operated at present under a lease by the Bangor & Portland Railroad, the lease expiring in 1898. The object of increasing the capital stock of the company is to enable it to extend its line from its present terminus in Easton to a connection with the main line of the Lehigh Valley at South Easton.

Harriman Coal & Iron.—On July 20 the railroad property of this company was sold at Knoxville, Tenn., by the United States Court to E. A. Quintard, a representative of the Citizens' Savings Bank of New York, for \$200,000. It is said that the new owners intend to develop the coal interests along the line.

Indiana, Decatur & Western.—The two separate companies, the Decatur & South Eastern and the Indiana & Western, which were formed about a year ago to hold the property of this line (the Indianapolis, Decatur & Western) pending reorganization proceedings, were formally consolidated this week, meetings of the stockholders of both companies being held at Decatur, Ill. The corporate name is now the Indiana, Decatur & Western Railway Company.

Jack-onville, Mayport & Pablo Railway & Navigation Co.—The property, franchises and rolling stock of this company will be sold at public sale on Monday, Sept. 2. There are \$165,000 worth of bonds outstanding, secured by a first mortgage on the property. The line is 22 miles long, running east from Jacksonville, Fla.

Lehigh Valley.—The company has sold \$6,800,000 of Lehigh Valley Coal Company's bonds in London. The company some time ago transferred a floating loan of \$3,000,000 from this side to London. It gave as collateral Lehigh Valley Coal 5s with an option of purchase and the lenders have now exercised their option. The bonds were sold through Brown, Shipley & Co., and it is believed that the price received was about 105. The proceeds after settling the floating debt will furnish the company with over \$3,000,000 in cash, but the officers will not state what this money will be used for.

Oregon Short Line.—A decree ordering the foreclosure of the consolidated mortgage of the Oregon Short Line & Utah Northern was signed by Judge Bellinger in the United States Court, at Portland, Or., July 15. J. B. Clelland is appointed to conduct the sale at Salt Lake City. This order applies to that portion of the road in Oregon, Idaho and Montana. The decree must be concurred in by Judge Sanborn of St. Paul and Judge Merritt, of Utah, before the road can be sold.

Pittsburgh, Cincinnati, Chicago & St. Louis.—At Cincinnati, July 21, Judge Saylor decided in favor of the plaintiff the suit of Henry and others against the Pennsylvania Co. The decision requires the latter to pay about \$750,000 interest on the disputed lease of the Cincinnati & Muskingum Valley. The ground of the original suit was that the Pennsylvania had deliberately diverted business from the C. & M. V., but the present decision hinges on a technicality. It will probably be appealed to a higher court. The facts in the case are as follows: In 1873, the Cincinnati & Muskingum Valley executed a lease to the Pittsburgh, Cincinnati & St. Louis, to run 99 years. The lessee was to advance funds to pay interest on bonds of the lessor for \$1,500,000 at 7 per cent., making \$52,500 at each payment. Certain betterments were to be made by the lessor. But the lessor did not make them, so the lessee made them to the extent of \$150,000, which the lessor failed to pay. The road was run by lessee until July, 1885, lessee advancing \$800,000 to pay coupons. In 1885, one minority shareholder of the lessee filed a petition in the Jefferson Common Pleas Court, asking to have the contract of the lease set aside, as having been obtained by fraud. The lease was vacated, but an appeal was taken by Henry, a party defendant.

After this appeal was perfected the lessee in 1886 took steps to turn the road over to the officers of the lessor company and the directors of the lessor company passed a resolution accepting it. The road was then run by these officers in the name of the lessor company and in 1892 and 1893 proceedings were taken by the directors and stockholders of the lessor company and the P., C., C. & St. L. (successor of the P., C. & St. L.) to cancel the lease. This resolution passed by a vote of two-thirds of all the shares of the P., C., C. & St. L., but only by a majority of the shares of the C. & M. V. The whole case turns on the fact that these latter proceedings were begun in 1886, after the appeal of Henry was perfected, and on that point the court finds that the attempt to cancel the lease was illegal as the statutes require a two-thirds vote. The lease, therefore, is still held by the P., C., C. & St. L.

Savannah, Americus & Montgomery.—The Purchasing Committee, consisting of R. B. Sperry and others, have taken steps this week to secure a charter for the new company to take over this property. The name of the new company is the Georgia & Alabama Railway Co.

Southern.—The company has sold to a Baltimore syndicate, headed by the Maryland Trust Co., the bonds of the Georgia Southern & Florida, which it took

when it bought control of the company, at such a price that the stock, retained by the Southern, has cost practically nothing, and the control of this connection is thus retained practically without any expenditure. The Georgia Southern & Florida extends from Macon, Ga., to Palatka, Fla., 285 miles. The company owns 80 acres of terminal at Macon and 36 acres at Palatka. While in the hands of receivers, it has been self-supporting from local business alone. This traffic is diversified: watermelons, cotton, oranges, early vegetables and fruit, and lumber.

Hambleton & Co., the Baltimore bankers, in their circular say:

"The placing of the road in the hands of receivers was caused by no inability of the road to take care of itself, but through complications with the Macon Construction Company and the Macon & Birmingham road, whose bonds the G. S. & F. had endorsed. Later, a bondholder's committee was formed, a plan of reorganization agreed upon, and the property was sold under foreclosure and bought in for the bondholders. The reorganization is based upon safe lines; the fixed charges of the new company are placed well within the present earning capacity of the property.

Under the plan of reorganization, the G. S. & F. will issue the following securities:

First mortgage 5 per cent. 30-year gold bonds.....	\$4,000,000
First preferred stock.....	64,000
Second preferred stock.....	1,084,000
Common stock.....	1,000,000

The earnings for eleven months, to May 31, were:

Gross earn.....	\$777,192
Oper. exp.....	573,357
Net earn.....	\$203,835

It will require only \$3,600,000 of the \$4,000,000 first mortgage bonds to carry out the plan of reorganization, so that \$400,000 of said bonds will remain in the treasury of the company. The fixed charges, under such conditions, will be only \$180,000, while it is expected that the road will earn this year \$230,000 net.

Southern.—The city government of Norfolk, Va., has voted to lease to this road the warehouse, wharf and other property in that city, which has been the subject of negotiations for some time. The lease will be for a period of 30 years, renewable in perpetuity at the company's option. The company is to pay annually a rental of \$1, and taxes, amounting to about \$1,700. It is to establish at Norfolk a deep water terminus. President Spencer and Vice-President Andrews attended the meeting of the special committee at which the terms were agreed upon and they are presumed to be acceptable.

Texas Trunk.—The date appointed for the sale of this property, in the foreclosure suit brought by the Central Trust Co., of New York, is Aug. 6. This road is about 47 miles long, extending from Dallas, Tex., southeasterly to Kemp. In a suit instituted by the receiver, in the United States Court at Dallas, against C. T. Campbell and others, Judge Rector rendered a decree last week which quiets the title to all of the property of the company.

Valley (Ohio).—The two Bondholders' Committees met in New York last week and came to an agreement by which the Baltimore & Ohio and the Wheeling & Lake Erie interests will join in an amicable arrangement for the management of the road.

A circular has been issued giving some of the particulars of the contract. The agreement runs for 99 years, and is a strong traffic alliance. The Valley Railway, from Cleveland south to Valley Junction, 75 miles, where it connects with the Wheeling & Lake Erie, and that portion of the main line of the latter from Valley Junction to Wheeling, 66 miles, make a line from Wheeling to Lake Erie only 141 miles long, said to be the shortest existing railroad route. This gives the Baltimore & Ohio a connection between Wheeling and its Cleveland line about as good as though it were owned, while the Wheeling & Lake Erie secures an equally advantageous connection with Cleveland for its own business. The latter company has the right to acquire yards of its own in Cleveland and to connect them with the Valley track. It is stated that a second main track will be built from Cleveland southward, 5 miles, to Brooklyn.

This agreement obviates what must have been a severe contest, as the Baltimore & Ohio committee controlled one-third of the first mortgage bonds and two-thirds of the second mortgage bonds; while the Wheeling & Lake Erie committee controlled two-thirds of the first mortgage bonds and one-third of the second mortgage bonds. Neither committee was in a position to put through a reorganization by itself. The suits now pending for foreclosure of the first and second mortgages will probably be speedily settled.

Worcester, Nashua & Rochester.—This company, whose road is leased to the Boston & Maine, has received authority from the Massachusetts Railroad Commissioners to issue bonds not exceeding, with all other bonds outstanding, \$1,454,000. The amount outstanding on June 1 last was \$1,404,000, leaving only \$50,000 yet to be issued. It would seem from the reports that the commissioners in this action pass no opinion as to the validity of the \$350,000 in bonds which were issued some time ago without their permission.

York Southern.—This narrow gage railroad is to be made standard gage and the work of laying the new rails has already been begun. Much of the preliminary work was finished some time ago. This road extends from York, Pa., southward to Delta, Md., 34 miles. Standard gage engines have been ordered from the Baldwin Locomotive Works and cars from the Jackson & Sharp Company.

TRAFFIC.

Traffic Notes

Ten carloads of live hogs recently arrived in St. Paul from the state of Washington.

On July 13 the Pike's Peak Railroad took 600 passengers to the summit of the mountain.

The Atchison, Topeko & Santa Fe has begun the free delivery of freight to merchants in Richmond, Tex.

The Standard Oil Co. has begun shipping crude oil in tank barges from Whiting, Ind., to Duluth. Barge No 75 was loaded last week with 300,000 gals.

The New Orleans merchants' steamship line having been given up, the Panama Railroad will establish a steamship line between that city and Colon on Aug. 15.

The Interstate Commerce Commission met in Atlanta, Ga., this week, to hear the complaint of the fruit shippers, noted in the *Railroad Gazette* of July 5 and July 12.

The railroad and steamboat lines between New York City and Coney Island have reduced the fare from 40 cents to 25 cents for the round trip. The Iron Steamboat Co. at once trebled its traffic.

July 20, the best previous day's freight movement in the history of the Middle Division of the Pennsylvania—5,494 cars on Aug. 11, 1894—was eclipsed by a movement of 5,890 cars, an average of 65½ cars per train.

During the month of June the shipments of anthracite coal, according to the official statement, amounted to 3,777,644 tons, which, strange to say, is within the amount agreed upon by the companies at the beginning of the month.

The Interstate Commerce Commission has appealed to the higher court in the Troy (Ala.) case, wherein the Circuit Court decided that the long and short haul section of the Interstate Commerce law did not apply to the Troy shipments in controversy.

The Southern Railway and Steamship Co. met at Asheville, N. C., July 17, 18 and 19, and, it is said, made substantial progress toward an organization for the coming year in which it is believed the Seaboard Air Line will join; but it was given out that no final action was taken and another meeting will be held in New York City, Aug. 13.

The Wholesale Grocers' Association, at Charleston, S. C., whose action is endorsed, it is said, by the merchants of 61 other cities in the South, has passed a resolution to boycott the Louisville & Nashville because the carload rates on grain, flour and other important commodities from western points to the South are not low enough as compared with rates on less than carloads. It appears the rates complained of are the same by all the lines, but the grocers attacked the Louisville & Nashville on the ground that that road was the prime mover in the refusal to grant the shippers' demands.

The Railroad Commissioners of New York have dismissed the complaint of certain passengers residing along the Harlem River Branch of the New York, New Haven & Hartford concerning a five-cent fare which they have to pay over a short line between Willis Avenue, the southern terminus of the New York, New Haven & Hartford line over which they travel, and the northern terminus of the Manhattan Elevated road at 129th street, New York City. The piece of road in question is partly on the surface and partly elevated and a part of it is owned by the Suburban (leased to the Manhattan) and a part by the New Haven Company. The bridge over Harlem River is a part of it. The trains of the New Haven road run through to 129th street, but each transient passenger has to pay five cents more to 129th street than to Willis Avenue; and it appeared in the testimony at the hearing that this five cents goes entirely to the Manhattan Company. The Commissioners dismissed the complaint because a part of the road is not elevated and therefore does not come within the law of 1894, under which the complaint was made. They promise to investigate the policy of the New Haven road in this matter.

The Flour Trade.

In the quarter ending June 30th there were ground in Minneapolis mills 2,363,575 bbls. of flour, as against 1,722,890 in the preceding three months. During the quarter there were exported to foreign ports 517,460 bbls., as against 434,570 in the preceding quarter. Duluth and Superior mills ground in the same time 894,675 bbls., as against 306,075 bbls. in the preceding quarter. The exports from these cities for the quarter were 260,132 bbls. There were ground in Minneapolis for the half year to date 4,086,465 bbls. and at Duluth and Superior 1,900,710 bbls. The flour market has been less active since May prices have declined, and the export trade has fallen materially.

Chicago Traffic Matters.

CHICAGO, July 24, 1895.

The Chicago & Ohio River Passenger Association a journeyed Friday after a two days session, at which a new agreement was perfected which will be submitted to the presidents this week for action. A new agreement seems to be even more of a necessity with the Ohio River lines than with the other associations.

The various freight committees of the Central Traffic Association are checking up rates on the proposed new basis, preparatory to submitting the measure for final action in September, as stated in my letter last week.

Once more an attempt is to be made to form a new passenger association covering western territory, and a meeting convened here to-day at which all the interested lines were represented.

Action will be taken by the associated roads this week to protect tickets for the G. A. R. excursion to Louisville and the Knight Templar excursion to Boston. Profiting by the trials with the Christian Endeavor excursion, it is proposed to take united and timely action, such as will leave no possible loophole for the demoralization of rates. As a matter of fact, the disturbance arising from the Christian Endeavor excursion was trifling compared with the trouble that has been experienced in previous years, and shows what is possible when the roads honestly attempt to protect rates.

Eastbound all-rail shipments last week show a falling off compared with the preceding week, largely in grain and flour. Lake shipments were also light and rates were dull. Shipments of grain by lake were: 412,995 bu. wheat, 466,844 bu. corn and 211,284 bu. oats.

The New England lines have notified the western roads that none but prescribed forms of tickets will be honored for the Knight Templar excursion and none other will be certified for return passage.

The shipment of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending July 20, amounted to 56,400 tons, against 63,873 tons during the preceding week, a decrease of 7,473 tons and against 29,146 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JULY 20.		WEEK TO JULY 13.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central.....	6,814	12.0	5,980	9.3
Wabash.....	6,443	11.4	5,545	8.7
Lake Shore & Mich. South.	6,381	11.3	6,921	10.8
Pitts., Ft. Wayne & Chicago	7,800	13.8	9,700	15.2
Pitts., Cin., Chi. & St. Louis.	7,543	13.3	6,134	9.6
Baltimore & Ohio.....	4,960	8.7	5,859	9.2
Chicago & Grand Trunk.....	3,346	6.0	3,570	5.6
New York, Chic. & St. Louis	6,682	11.8	11,418	17.9
Chicago & Erie.....	4,874	9.0	6,364	10.0
C., C., C. & St. Louis.....	1,554	2.7	2,382	3.7
Total.....	56,400	100.0	63,873	100.0

Of the above shipments 1,532 tons were flour, 23,870 tons grain and mill stuff, 9,744 tons cured meats, 8,517 tons dressed beef, 2,306 tons butter, 1,119 tons hides, and 6,300 tons lumber. The three Vanderbilt lines carried 35.1 per cent., the two Pennsylvania lines, 27.1 per cent.